TECHNOLOGY DEPT.

Gas Journal

Vol. 265. 103rd Year. LONDON. JANUARY 24, 1951. No. 4573. Price 1/-

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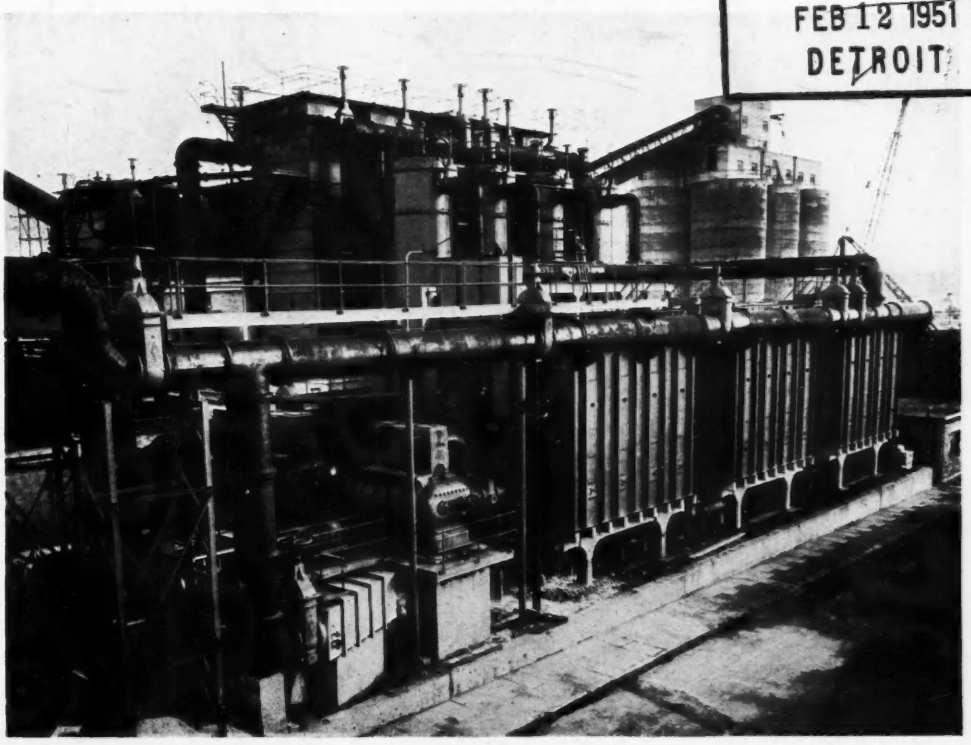

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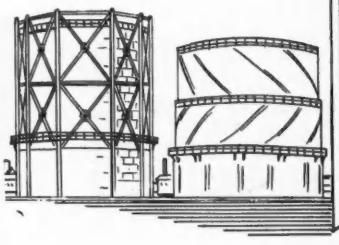

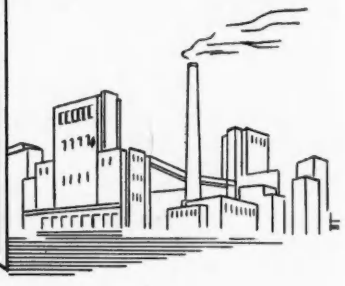

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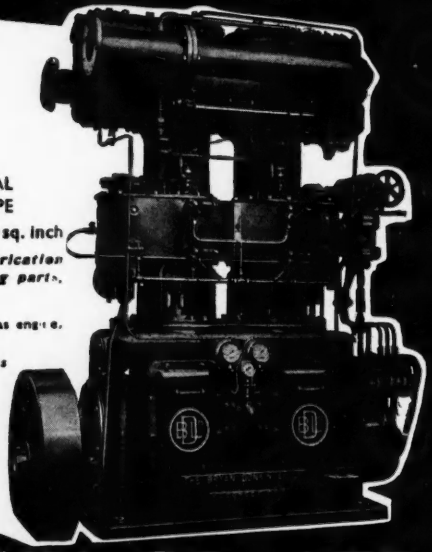

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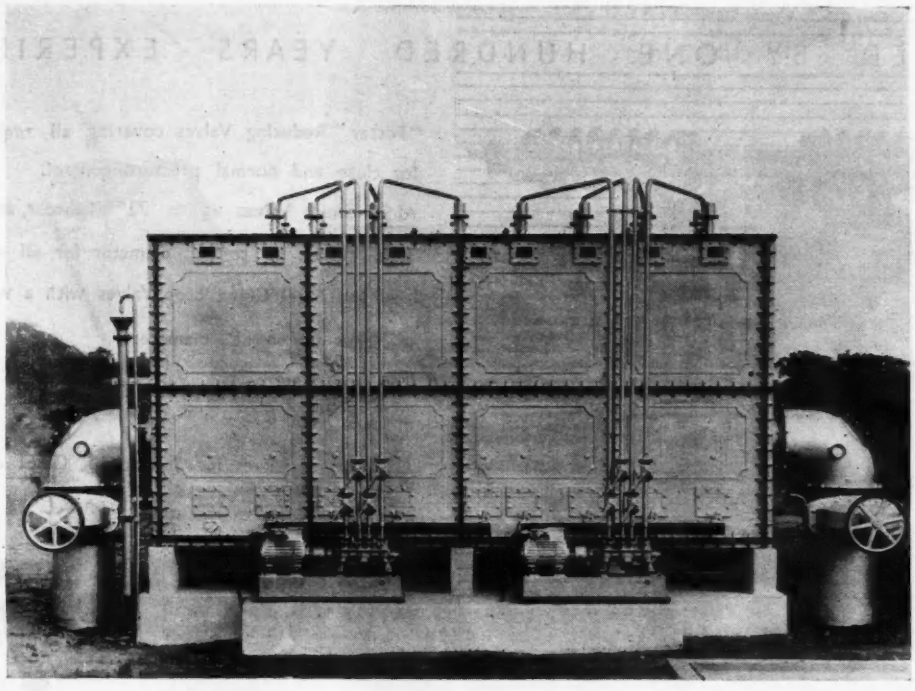

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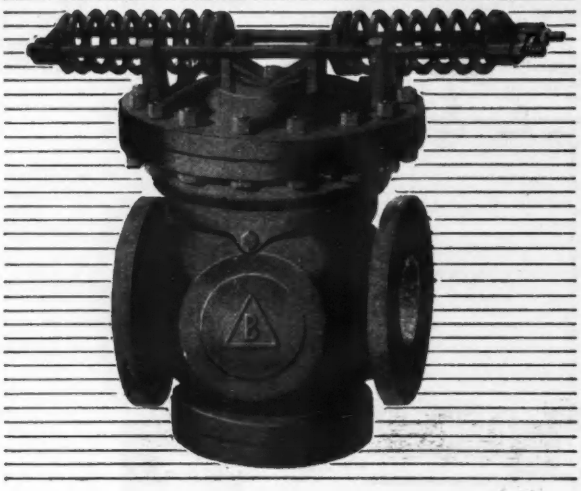

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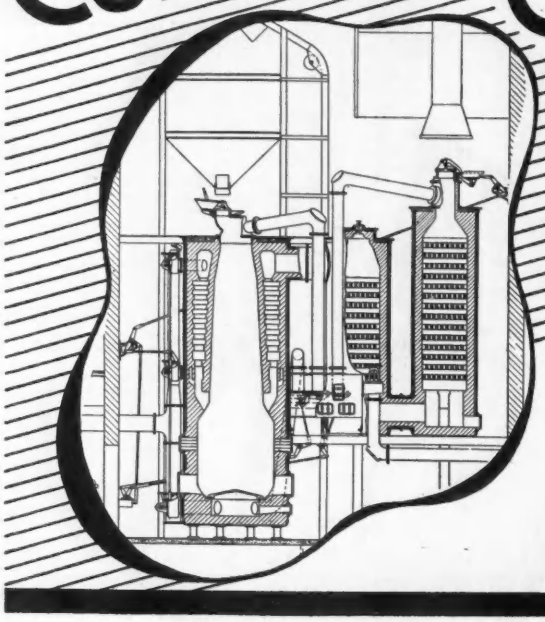

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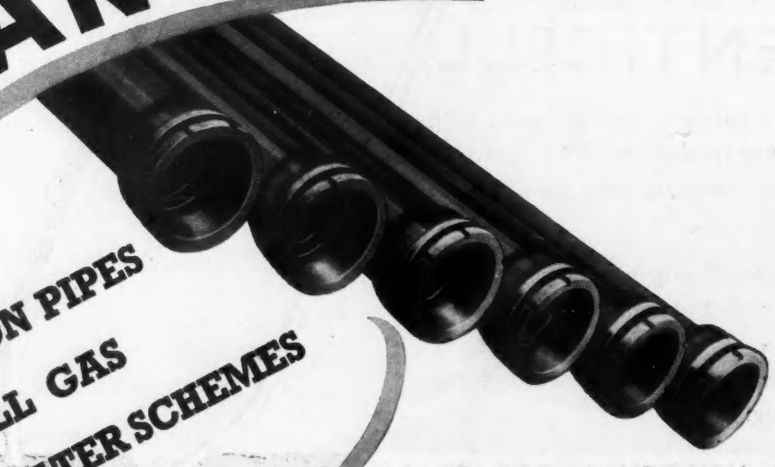

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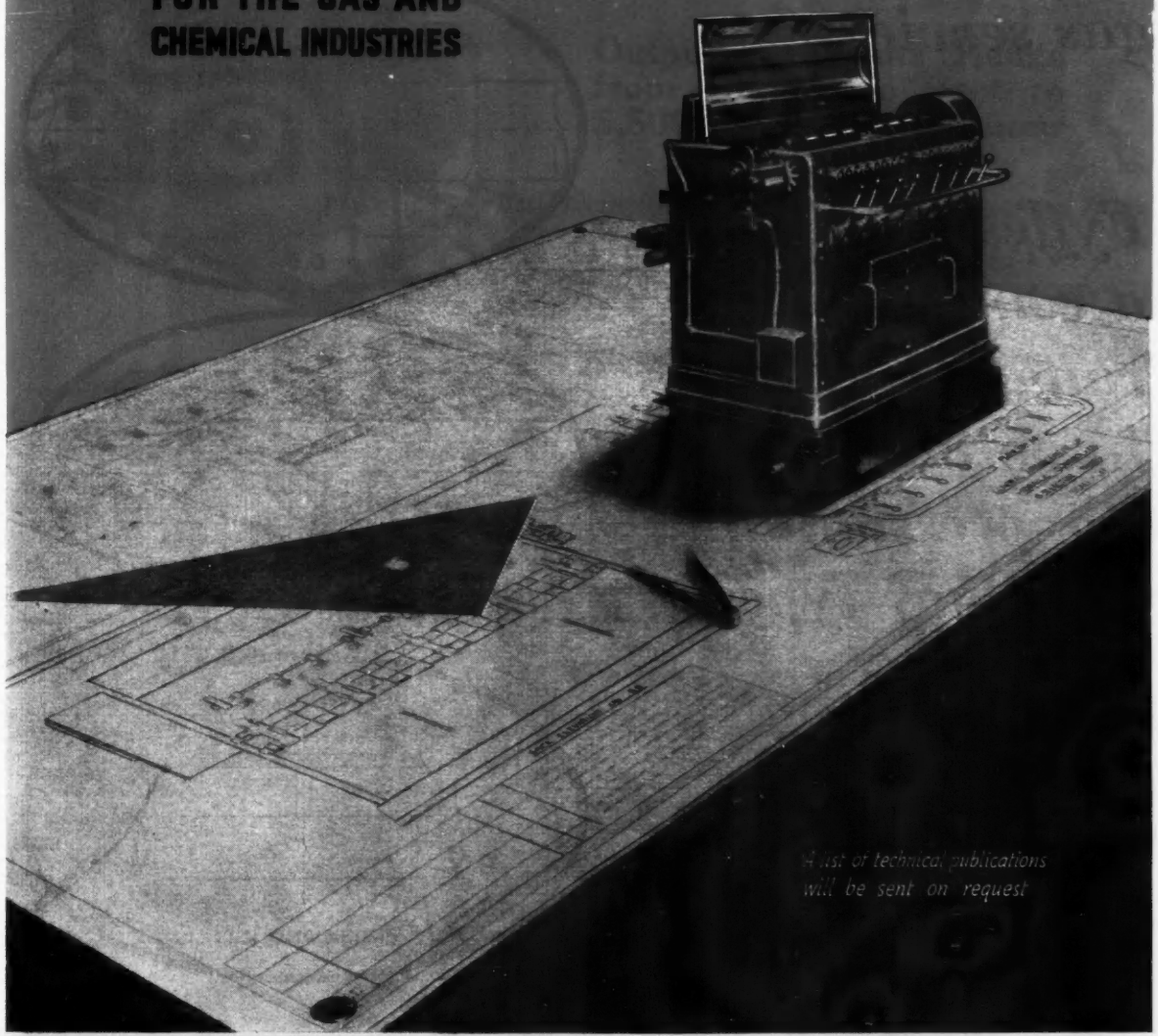

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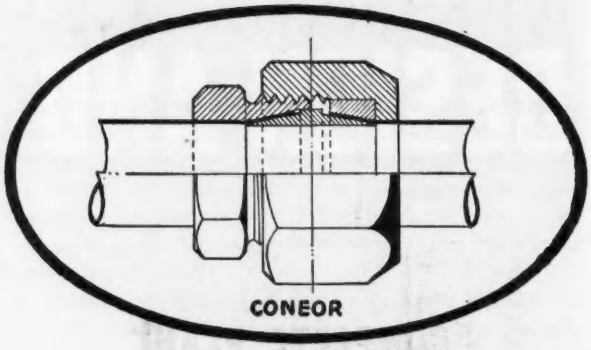

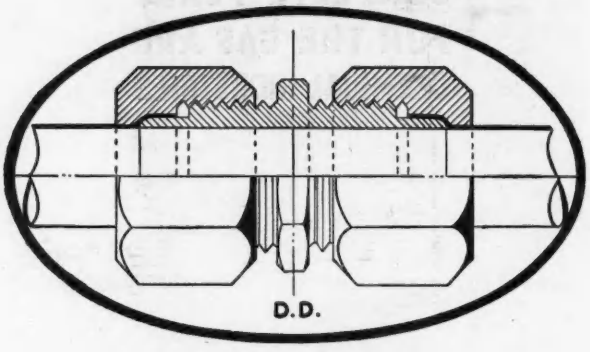

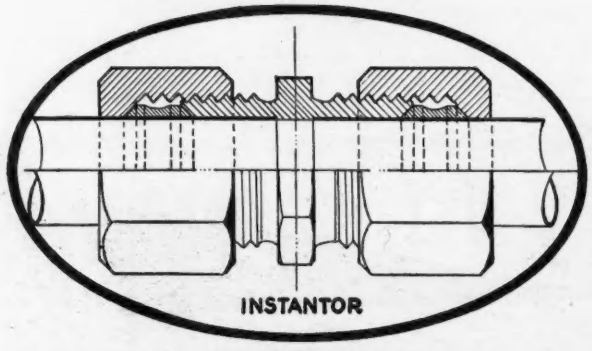

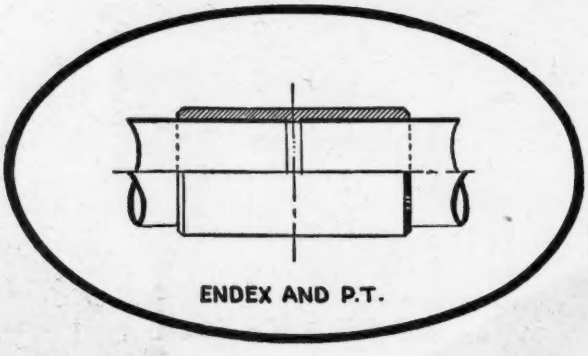

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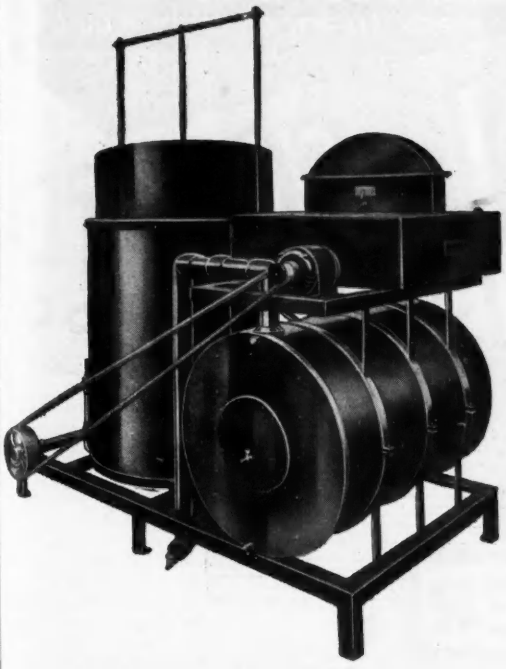

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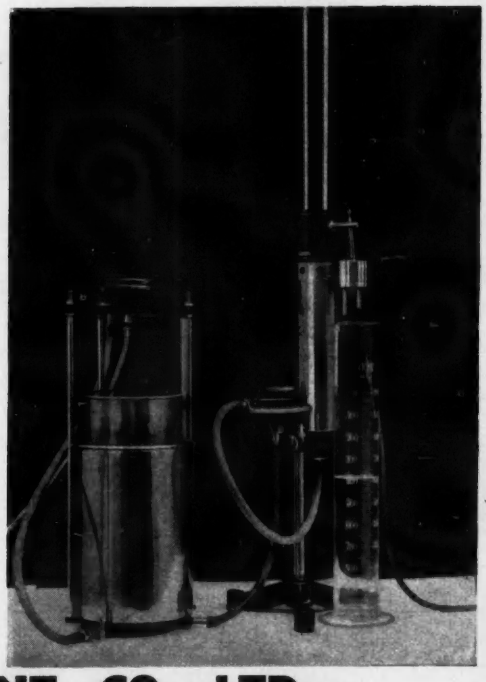

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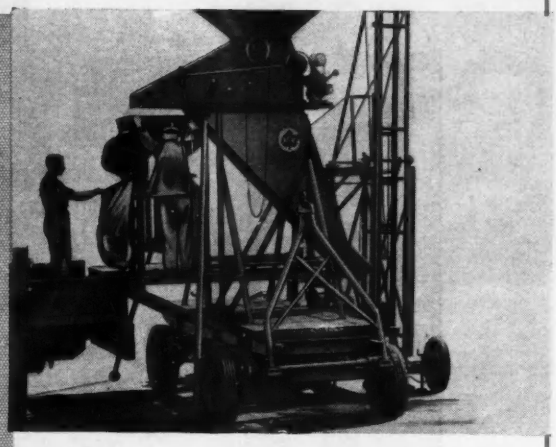

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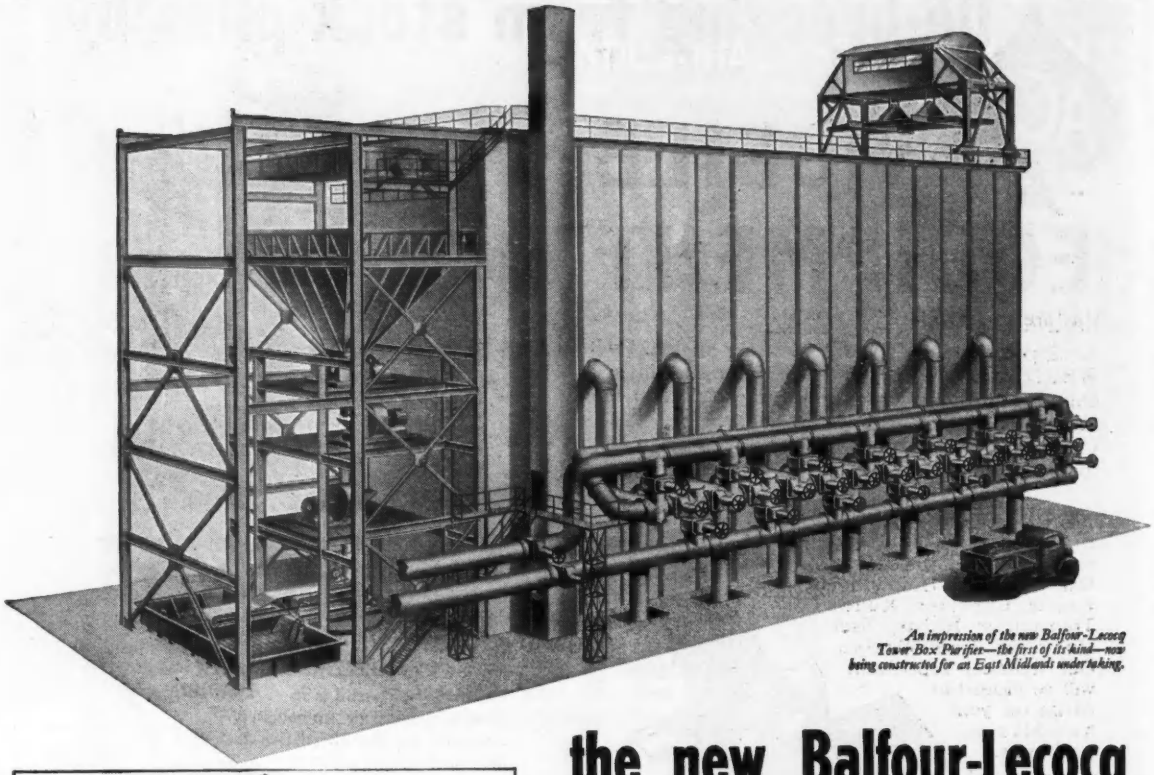
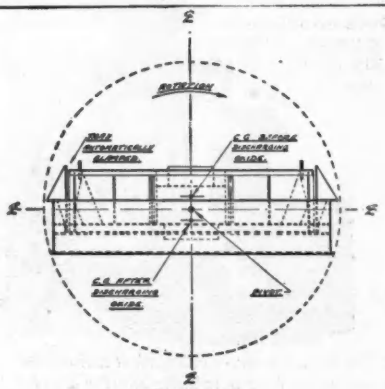


An impression of the new Balfour-Lecocq Tower Box Purifier—the first of its kind—now being constructed for an East Midlands undertaking.



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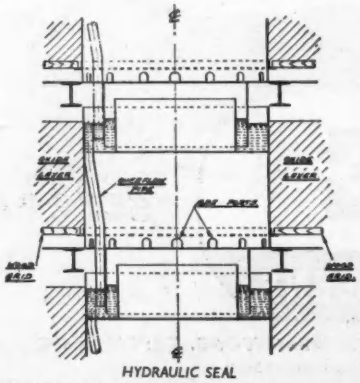

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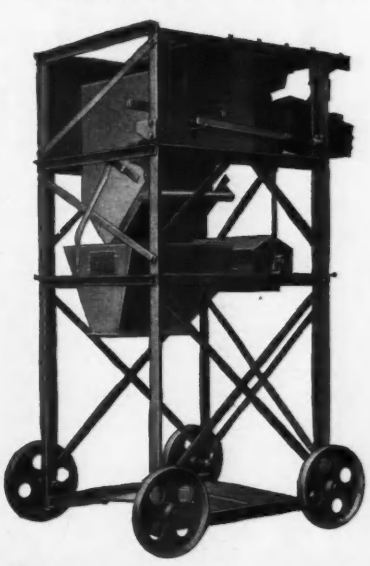

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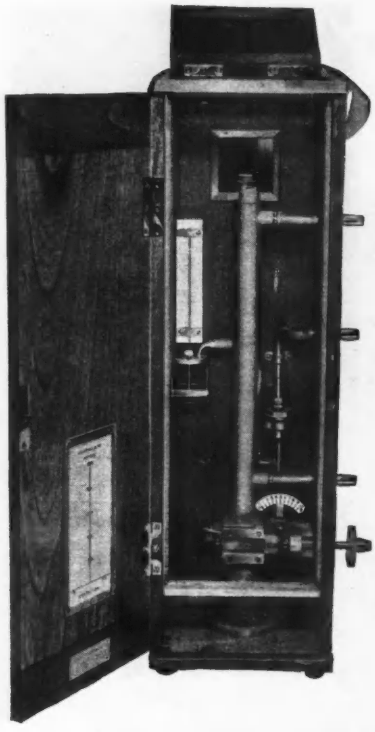

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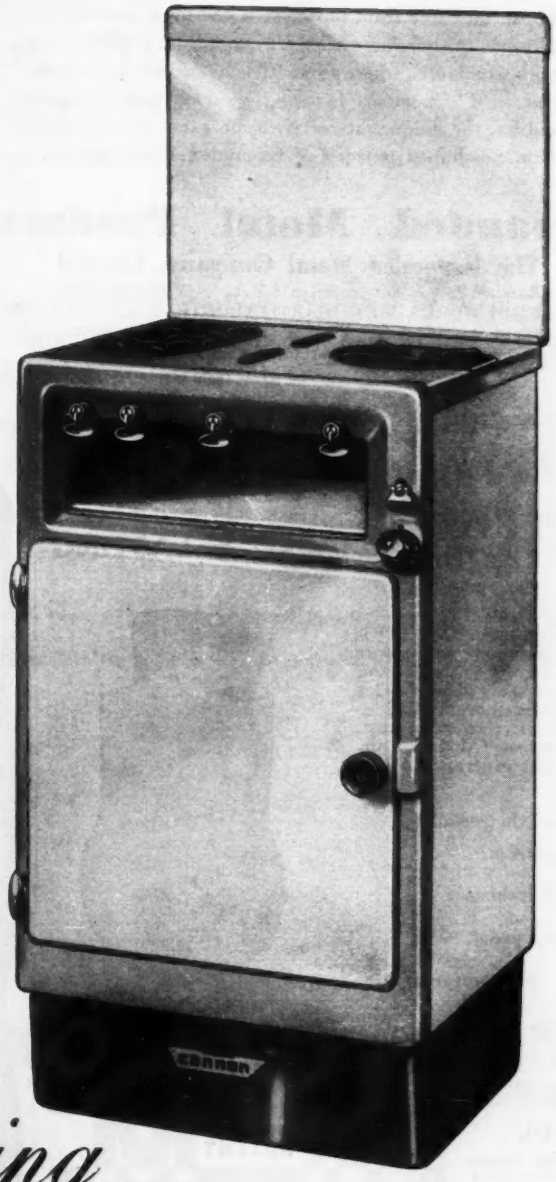

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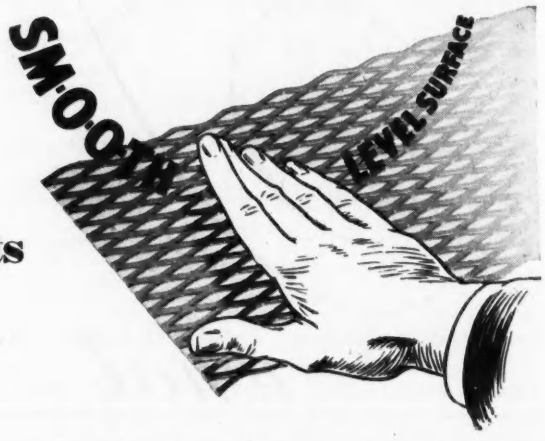

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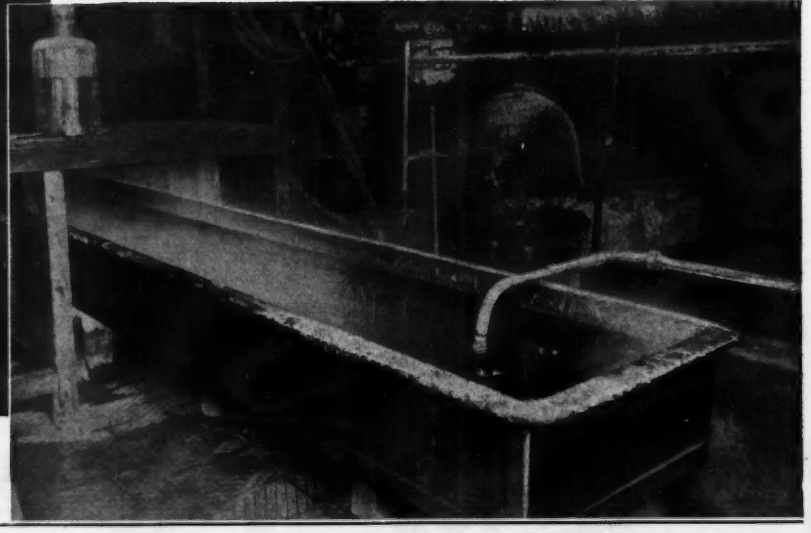

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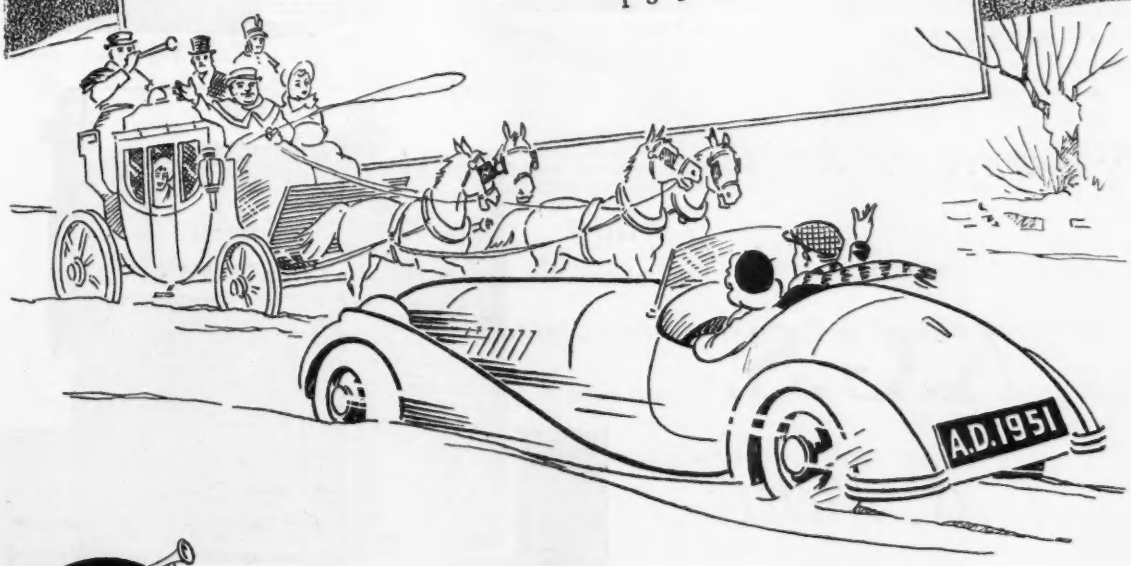

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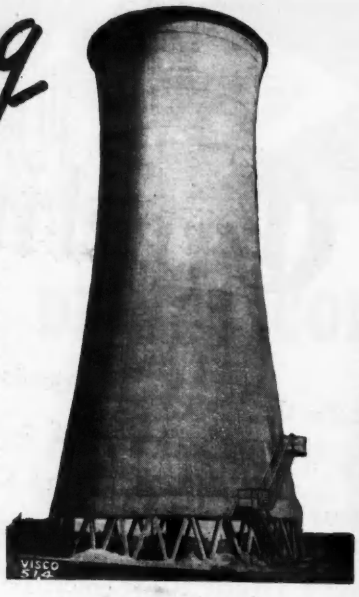

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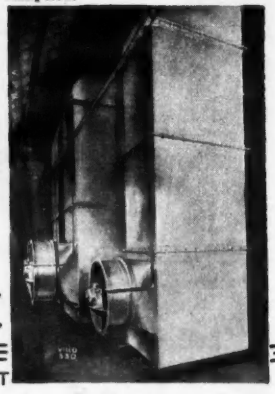

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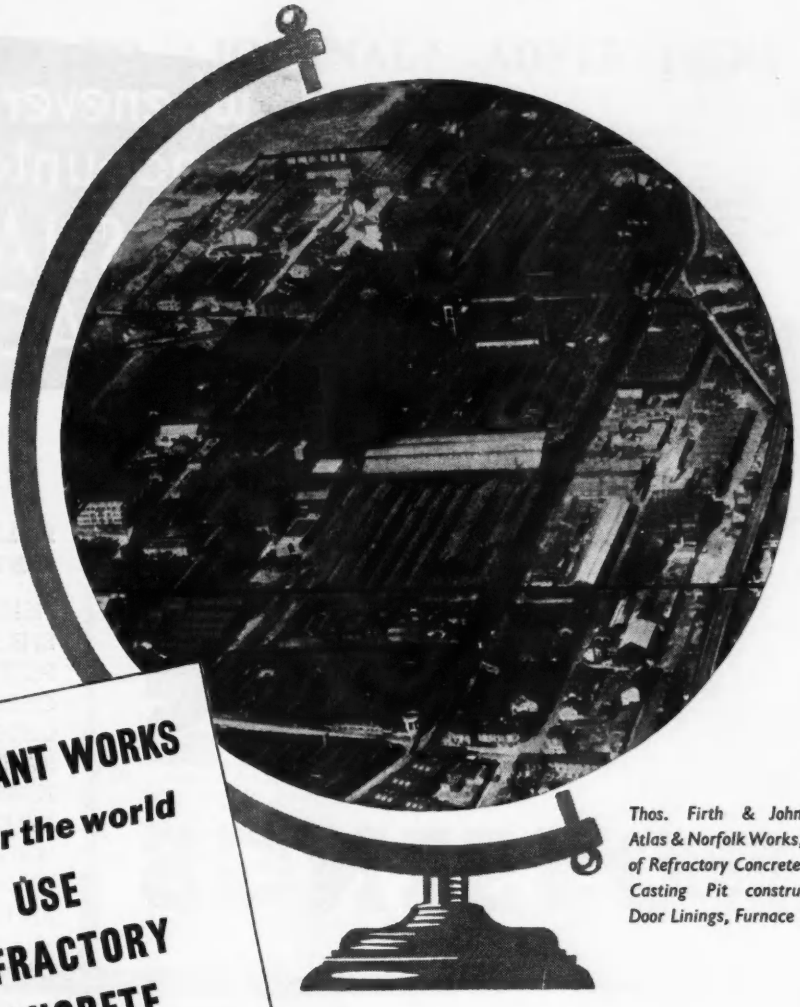

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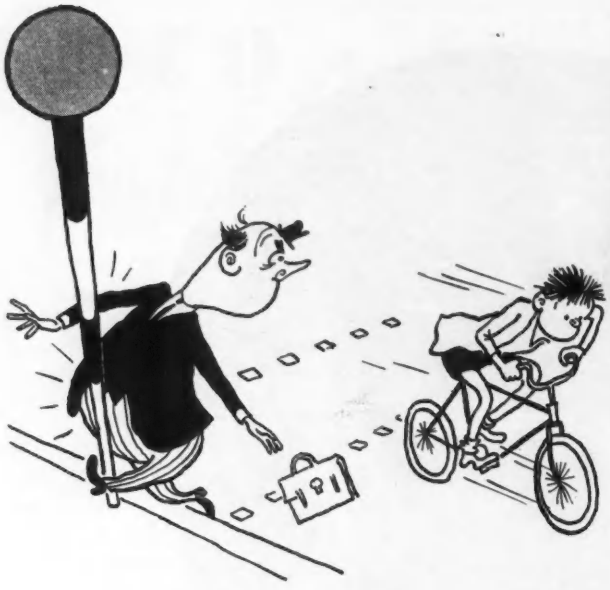

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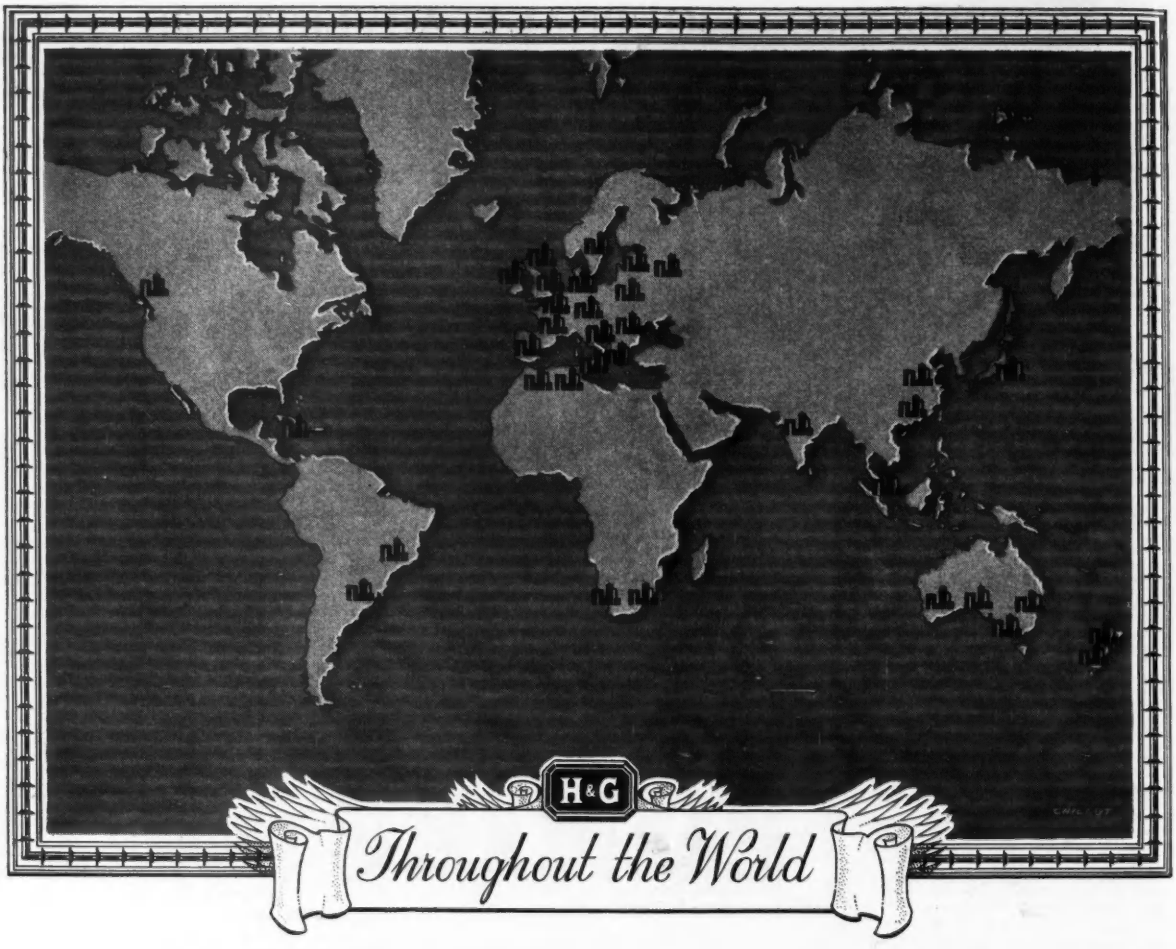

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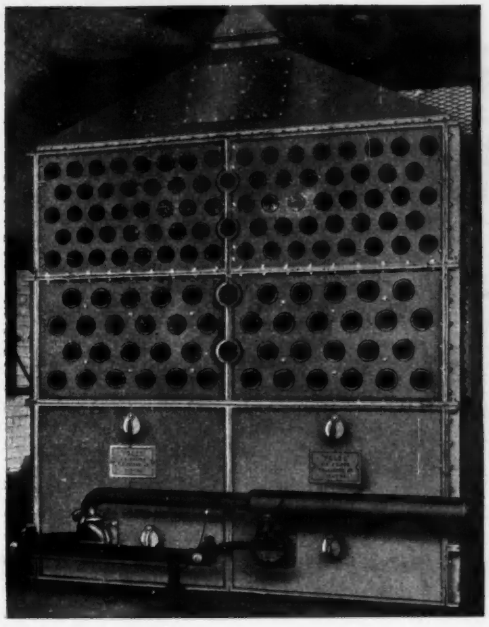

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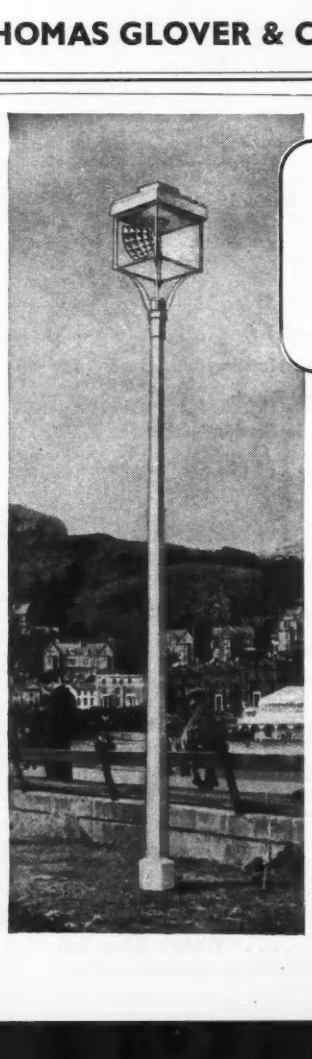

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GAS JOURNAL

VOL. 265. NO. 4573 103RD YEAR JANUARY 24, 1951

PUBLIC ACCOUNTABILITY

THE first annual reports of the Gas Council and the 12 area boards which, together with the first report of the Minister of Fuel and Power on the exercise of his functions under the Gas Act, are to be presented to Parliament within the next few weeks, or perhaps days, will mark a new departure in the accountability to Parliament of the nationalised industries. Whereas the area electricity boards submit their reports to the British Electricity Authority, which in turn presents them, with its own, to the Minister of Fuel and Power, the Gas Council and the area boards will submit their reports separately. Indeed, although the area boards are obliged to consult the Gas Council on certain financial matters, there is nothing in the Act which compels them to furnish the Gas Council with advance copies of their reports. Section 10 is quite clear: 'Every area board and the Gas Council shall, as soon as possible after the end of each financial year, make to the Minister a report on the exercise and performance by them of their functions during that year and on their policy and programmes, and every area board shall, as soon as their report has been made to the Minister, send a copy thereof to the Gas Council.'

It was part of the argument for nationalisation that nationalised industries would be fully accountable to the public for their actions, and where they have been given monopolistic powers the importance of such public control is even greater, but it is already becoming clear from the experience of the industries nationalised since the war that effective public control of such industries is much harder to achieve than had been appreciated. In the case of the gas industry, however, Parliamentary control was already so complete that nationalisation made little difference so far as legislation was concerned, and it may well be that after the area boards have overcome the initial difficulties of setting out their reports and accounts to an approved pattern they will be able to show that they have shed some of the old fetters and are able to approach their problems with a wider conception.

In view of the imminence of the first annual reports we have read with perhaps rather more than normal interest the first two of 12 research papers dealing with aspects of the nationalised industries, published by the Acton Society Trust, which it is emphasised has no connection with any political party. The Trust, whose aim is the objective scientific study of political and economic structures in relation to human needs, and of political forces and processes, was established under a Deed of Trust in October, 1948, as a charitable body for the promotion of economic, political, and social research, and for the publication of material in keeping with its aim. The Society derives its income from funds made available by the Joseph Rowntree Social Service Trust. The first of these papers, 'Accountability to Parliament,' discusses the whole field of Parliamentary procedure and describes as 'too little and too late' the facilities for debating the annual reports and accounts of the nationalised industries. The National Coal Board report for the year ended December 31, 1948, was not debated until November 10, 1949; the Transport Commission report for the same period was debated on December 1, 1949; and the B.E.A. and electricity boards' reports for the year ended March 31, 1949, appeared in January, 1950, but were not debated until the end of July. Commenting on the fact that the first reports of the Gas Council and area boards for the year ended March 31, 1950 are expected this month, the paper says the blame for this state of affairs must rest about equally on the boards and on the Government, but 'unlike the industries, the Government has made an improvement lately, debating the coal and transport reports within a month of their publication.' Attempting to answer the question, 'Can Parliament find a way of functioning more effectively?' the paper suggests that more members should specialise in understanding the problems of the nationalised industries. A second alternative is to transfer part of the burden to some body other than Parliament; to some extent it was hoped that the consultative councils would relieve Parliament of handling minor complaints, but for major matters use might be made of some specialist quasi-judicial body. Finally, mention is made of the proposal for an economic or industrial Parliament—a third chamber ultimately subordinate to the House

of Commons, but taking over much of the business of economic and industrial affairs, able to legislate, subject to the veto of the Commons.

The second paper, 'The Power of the Minister,' deals with the popular notion that the Ministers responsible for the nationalised industries have been given too much power, and points out that various circumstances restrain the Minister from unrestricted use of his powers. Sub-section 2 of section 10 of the Gas Act requires the reports of the area boards and the Gas Council to set out any direction given by the Minister 'unless the Minister has notified the board or Council of his opinion that it is against the interests of national security to do so.' The research paper says one cannot but feel some alarm at the Minister's power to prevent the disclosure of his own actions when in his opinion it is not in the interests of security to do so. Provision for the disclosure of such actions to at least one disinterested party is obviously essential. 'It is a matter for surprise', the report adds, 'that any Parliament should have been prepared to assent to such a condition.'

NEW MINOR INDUSTRY

THE highly interesting account given recently by Mr. C. L. Taylor to the Western Junior Gas Association (*ante* p. 165) will, we feel sure, have been studied to advantage. It was concerned with the Jones gas-making process. It will be recalled that in 1936 the late Mr. G. M. Gill during a visit to the United States inspected many oil-gas plants. He appreciated the potentialities of this type of process for peak load gas production and its possibilities in using crude tar for gas-making. In the same year it was decided to erect at the Newport gasworks oil-gas plant to act as standby, and Mr. L. B. Jones, who died in 1943, was invited to this country to design the plant. The British company of Jones Gas Process came into being, and subsequently further plants were erected at Cheltenham, Stourport, and Swindon. Experience with all these plants was described by Mr. Taylor, and a major outcome of their development has been the start of a new minor industry in this country—that of carbon black production. The dry carbon from the process is marketed under the name of 'Seval' black. The greater portion of production is sold in the home rubber trade, though substantial tonnages have been exported. General opinion is that there will always be a demand for this type of black even though a limited one. The author was right in maintaining that the research and engineering departments of the Jones Gas Process can claim to have done a good job of work in connection with carbon black production. Though a sale for considerable quantities of the carbon containing 60% of water has been obtained for the manufacture of carbon electrodes for the aluminium industry, current research is centred on increasing the amount of carbon recovered dry. Mr. Taylor did not deal with the economics of the process, but he did say that the income from the sales of 'Seval' is such that the cost of the oil-gas is considerably lower than coal gas or carburetted water gas. As a result, and coupled with the need to give continuously regular supplies of 'Seval,' the Jones plants are now part of the base load plant. Several raw materials have been used, but heavy fuel oil has given the best overall results as regards both gas and carbon production and ease of operation, and it has been decided to standardise on this fuel.

ANOTHER MILESTONE

THE first consignment of the 1951 edition of the *Gas Journal Calendar and Directory* has been dispatched, and within the next few days every *Journal* subscriber and every *Calendar* advertiser should have received his copy. Already since the issue went to press there have been retirements, appointments, and rearrangements of areas—our first monthly list of the changes will be published on February 7—but we feel we can claim that, with the help of innumerable friends in the industry, the Directory information was accurate when the final proofs were passed for press.

Nationalisation of the gas industry in 1949 necessitated a complete rearrangement of the Directory a year ago, and the sections of the 1950 edition dealing with the 1,000 odd undertakings in the United Kingdom bore little resemblance to those of pre-vesting date years. Twelve months' experience in making daily use of the information as set out in the revised form convinced us that there was little need for further rearrangement, and the revisions comprised in the new edition are restricted to those involved in bringing the information up to date. During 1950 we received many friendly communications calling attention to inaccuracies which, on investigation, were invariably found to be due to inadequate checking on the part of local officials on whose co-operation we have to rely so much for the compilation of the book. In some instances statistics had not been brought up to date; in one or two others excess of optimism had led to over-statements as to annual makes. Wherever such mistakes were referred back to area or undertaking officials there was the utmost readiness to achieve a higher degree of accuracy.

It is only with the full co-operation of gas officials at all levels that we can hope to maintain the accuracy of the information needed by so many people who serve the industry, either from within or as contractors or suppliers of plant and equipment. At the beginning of the New Year we would again suggest that such co-operation can best be afforded in three directions: (1) by ensuring that the latest edition is brought into use and the 1950 or earlier issue is scrapped; (2) by communicating news of changes as soon as they are officially approved, so that they can be included in our monthly revisions; and (3) by taking the comparatively little trouble of marking regularly in the copies of the Directory in constant use the corrections we announce in the first issue of the *Journal* in each month.

The list of gas and allied organisations contains the latest particulars of the new district sections of the Institution of Gas Engineers. The Handbook—a memorandum on gasworks practice, with general information and tables for daily reference—is preceded by a summary of the latest available gas statistics. The advertisements, with advertisers' directory and a 24-page Buyers' Guide, again reflects the enterprise of close on 300 firms who supply the industry's needs, from acid pumps to wrought iron tube fittings, and embracing everything needed in the manufacture, distribution, and utilisation of gas.

APPLYING THE BRAKE

DAME Caroline Haslett, Member of the British Electricity Authority, told a luncheon party of women journalists in London a few days ago that the British Electricity Authority intended to discourage the advertising of new electrical appliances during the next few months. At the same time the Authority took the long-term view that the labour-saving homes of the future should not be altogether sacrified to what were hoped to be temporary needs. In any case, she assured her audience, it was not cookers, washing machines, and vacuum cleaners that mattered so much as lighting and heating. Dame Caroline admitted that the occasion was an unhappy one for her, in that after preaching the use of electricity for over a quarter of a century she was now forced to urge housewives to economise in it. But women are accustomed by this time to being asked to save fuel. All appliances must be used intelligently nowadays from the point of view of the weekly or quarterly bills, quite apart from anything else, and housewives were urged to go to their local electricity service centres for advice. Dame Caroline gave an assurance that electricity rationing, at all events on the basis of present consumption, was unlikely to be introduced.

LOAD INDUCEMENTS

CONSIDERABLE outcry was raised not long ago over the action of the electricity authority at Taunton in offering certain financial inducements to persuade the local council to install electrical cookers in their houses. A somewhat similar instance—though with a rather different outcome—was reported to the Eastern Gas Consultative Council at its recent meeting. Some 50 council houses are being built at Huntingdon, and the local gas undertaking quoted £400 to lay gas mains to the estate. This the council refused to accept on the grounds that the electricity undertaking was prepared to put in a supply free of charge provided electrical cookers were installed. On learning of this the gas undertaking promptly agreed to waive its charge for laying the mains. We are all in favour of healthy competition—which is the very lifeblood of every industry, be it nationalised or not. But this is competition of a particularly senseless kind, which does nobody any good and may do a great deal of harm. Neither gas nor electrical mains materialise out of thin air. Some one has got to pay for them; somehow or other the capital charges have to be met—and if not met at the outset one may feel pretty sure they will eventually find their way on to the consumers' bills in some other form; or otherwise out of the taxpayers' pocket, which is much the same thing.

We regard this matter as one more item to be added to the Minister of Fuel and Power's ever-growing agenda under the heading of 'National Fuel Policy.' The two industries will have to get down to a common policy. Either all service mains are laid free and the capital charges reimbursed out of subsequent consumption (which may cut across the policy of uniform tariffs) or else both industries must charge the builder a fair price for materials and labour—with no 'under the counter' inducements to secure a load regardless of whether or not they deny the tenant that freedom of choice which is his right.

A WELCOME REAPPEARANCE

IT is a little over 10 years since the last number of *Service*, house journal of the Australian Gas Light Company, came off the press—a wartime casualty after some five years of useful life. Last month saw a resumption of publication of this valuable link between all sections of the organisation. Appropriately enough the first issue in the new series sets out to bridge the gap by indicating some of the more important changes and advances which have taken place in the company in the years between. Under the apposite heading of 'Then till Now,' we see in semi-diagrammatic form something of this progress; for example, gas sales have increased from 7,278 mill. to 11,472 mill. cu.ft.—equivalent to 58%—while revenue during the same decade went up by 70%. The Mortlake gasworks, past and present, forms the subject of another interesting review of progress. That Australia shares our fuel problems is instanced by a sad reflection that certain coal bins once containing three or four months' supply are now empty, and 30,000 tons of surplus coke has, like the coal, disappeared from the scene. It is interesting to note in passing that the Mortlake works contains a power house large enough to supply the electricity needs of a town of 10,000 people. On the distribution side we learn that during the 10 years gas mains have been extended by 323 miles and services by 188 miles. Not so much by reason of its importance as of the delight it gives to roll so typically Australian a place name off the tongue, we mention that the workshops at Woolloomooloo have been reorganised to cope with the servicing and maintenance of the company's transport fleet of 200 vehicles. The magazine does not forget the more intimate side of the company's activities, and a substantial number of pages are devoted to sporting and social events. In congratulating the Australian Gas Light Company, and particularly the editor, on this welcome reappearance, we cannot better conclude than by quoting from the general manager's message on the opening page: 'The decade now drawing to a close has been by no means an easy one for any of us, but despite all the difficulties with which we have had to contend the company has expanded its activities to keep pace with the ever increasing demand for gas in its area of supply. It is our earnest hope that the new year, on the threshold of which we now stand, will usher in an era of co-operation and goodwill in the joint task of solving the problems that still lie ahead.'

STEEL VESTING DAY

IT was in no spirit of criticism that Sir Robert Sinclair, President of the Federation of British Industries, in a luncheon address to North Midland Region members of the F.B.I. at Nottingham on January 17, made a further plea that 'at this time of real crisis' the Government might find it possible, without sacrifice of principles, to postpone the vesting date under the Iron and Steel Act. Circumstances have materially changed since, in the early autumn, the Government fixed February 15 for the change-over. The Government was then thinking of a rearmament programme which could be executed over a period of three years and, in the main, carried out by rising productivity without shortage of raw materials. In such conditions dislocation and distraction caused by the change-over might have seemed to the Government relatively unimportant, but under the changed circumstances of today this view cannot be maintained. What we are now likely to be compelled to try to do for defence, said Sir Robert, may well be very difficult of accomplishment in time, but can any responsible person deny that the difficulties will be increased if the take-over is persisted in next month? The steel industry, he said, is doing magnificently; why disturb it in any way at this critical stage of our history? To attempt to justify such a course by saying that if this opportunity is lost nationalisation of the steel industry will never happen was to admit that there was a fundamental weakness in the case for it. This was an opportunity for statesmanship—an act which would go a long way to remove suspicions that there were people in this country who put political considerations before national interests. Meanwhile the Iron and Steel Corporation announces that it will move into its new headquarters at 1, Chester Street early next month ready to take over its vast responsibilities on February 15. The Corporation will be organised on lines quite different from the other nationalised industries, in that it will be entirely decentralised. The management of the individual steel firms will be left in the hands of the existing directors. Most firms will retain their names, and function largely as autonomous units. There will be no regional boards, such as exist for coal, gas, and electricity. Mr. S. J. L. Hardie, Chairman, has been in consultation with the various companies in discussions about future policy. He is expected to make a public statement some time before vesting day.

EFFECTS OF POWER CUTS

A SURVEY of the effect of power cuts on Britain's industry has been carried out by Aims of Industry, Ltd., a non-party educational organisation, among its thousands of member firms. Questions put to the firms covered the number of electric power cuts between November 1, 1950, and the first week of January this year, man-hours lost, and financial losses to the companies and their employees. Working from a cross-section of replies the following rough estimate is put forward: Man-hours lost, 13,789,000; loss to firms, £8,485,300; workers' loss of earnings, £1,366,660. A summary of survey results shows that industries most vital to Britain's recovery have suffered the greatest production loss, that the former distressed area of the North East coast is the hardest hit, and that Sheffield seems to have had the greatest number of individual cuts. Many firms mention a hidden danger—the effects of voltage reduction, which has caused electrical apparatus to burn out.

Personal

Mr. S. T. Hoult and **Mr. A. Newton Roberts**, for reasons of health, have retired from the Board of Cellactite and British Uralite, Ltd.

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Mr. Hugh P. Barker, Managing Director of Parkinson & Cowan, Ltd., has accepted the invitation of the Minister of Transport to become a part-time member of the British Transport Commission.

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Miss M. F. Flack, Press and Publications Officer of the Women's Gas Federation, has been awarded the trophy for the best poem, judged by Frances Cornford, in the annual Literary Festival, 1950, held by the Society of Women Journalists.

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Mr. J. Waterhouse, Huddersfield undertaking, North Eastern Gas Board, and a member of the Yorkshire Junior Gas Association, left for Brazil on January 20 to take up an appointment with the San Paulo Gas Company, a subsidiary of the Brazilian Traction Co. of Toronto.

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Mr. G. H. Elliot, a Senior Technical Representative with Newton Chambers and Co., Ltd., is making steady recovery from injuries suffered in a road accident on December 27. He has undergone an operation in Leeds and the latest reports are encouraging.

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Mr. C. H. Mosedale, former administrative assistant to the divisional general manager of the Notts. and Derby division of the East Midlands Gas Board, was, at Derby recently presented with a leather wallet by the Chairman of the Board, Mr. H. F. H. Jones. Mr. Mosedale, who retired last March, began with the Derby Gas Light and Coke Company as a junior clerk in 1898, when he was 15. By 1929 he was accountant and became secretary in 1938. His services were rewarded with a seat on the board in 1947, and when the undertaking was nationalised he was appointed to the position which he held when he retired.

Obituary

Mr. Benjamin Swayne, who has died at Salisbury, aged 71, joined the staff of the Salisbury Gas Company as a boy clerk at the age of 16 and rose to the position of Salesman-Cashier. He was with the undertaking for 53 years, retiring nearly two years ago when the Company was nationalised.

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Mr. James P. Whimster, well known in the gas industry in Scotland and in business for some 40 years as a coal factor, has died at Helensburgh. A grandson of Thomas Whimster, Manager of the Perth undertaking, and son of the late James Whimster, Gas Manager at Armagh, he was also the brother of the recently retired Manager at Bath.

Diary

Jan. 25.—North Thames Gas Consultative Council: Westminster City Hall, Charing Cross Road, 2.30 p.m.

Jan. 25.—Midland Junior Gas Association: Afternoon visit to the works of the Rover Motor Co., Ltd., Solihull.

Jan. 25.—Scottish Junior Gas Association (Western District): Annual Dinner and Dance, Beresford Hotel, Glasgow.

Jan. 26.—Junior Institution of Engineers, Sheffield and District Section: 'Erection of a Spirally Guided Gasholder,' R. A. Benson, Grand Hotel, Sheffield, 7.30 p.m.

Jan. 27.—Wales and Monmouthshire Junior Gas Association (North Wales Section): Colwyn Bay. Address by Mr. Mervyn Jones.

Jan. 29.—West Midlands Gas Consultative Council: Dudley Room, Queen's Hotel, Birmingham, 2.30 p.m.

Jan. 30.—London and Southern Section, Institution of Gas Engineers: 'Water Pollution,' P. Wedgwood, M.SC. (Production Engineer, Watford Division). Institution of Gas Engineers, 17, Grosvenor Crescent, 2.30 p.m.

Feb. 2.—Scottish Junior Gas Association (Western District): Open Discussion Night, Royal Technical College, Glasgow.

Feb. 5.—Royal Society of Arts: Cantor Lecture on 'Training for Industry and the Professions,' by Sir Godfrey Ince, John Adam Street, Adelphi, W.C.2, 6 p.m.

Feb. 6.—South Eastern Gas Consultative Council: Adjourned quarterly meeting, Croydon, 2.30 p.m.

Feb. 9.—Institute of Fuel: Brains Trust, 'Coal Preparation, Marketing, Distribution, and Use,' G. S. Jenkins, J. W. Anderson, and H. E. Partridge, Robert Gordon College, Aberdeen.

Feb. 9.—London and Southern Junior Gas Association: 'Education and Training in the Gas Industry,' W. F. Pritchard (Tottenham Division, Eastern Gas Board), 178, Edgware Road, W.2, 6.30 p.m.

Feb. 12.—Royal Society of Arts: Cantor Lecture on 'Training in Industry,' by A. G. Beverstock and F. H. Perkins, John Adam Street, Adelphi, W.C.2, 6 p.m.

Feb. 13.—Institution of Heating and Ventilating Engineers: 'Town Gas and the Heating Engineer,' T. H. Pardoe, R.W.A. School of Architecture, Bristol, 6.30 p.m.

Feb. 13.—Midland Junior Gas Association: 'Outstanding Developments in Ferro-Concrete Construction,' J. A. Milner, Staff Mess Room, West Midlands Gas Board, Birmingham.

Feb. 14.—Institution of Heating and Ventilating Engineers: 'Space Heating,' P. H. Hollingworth, Radiant House, Liverpool, 6.30 p.m.

Feb. 14.—Western Junior Gas Association: Visit to the works of J. W. Singer & Sons, Ltd., Frome.

Feb. 15.—Wales and Monmouthshire Junior Gas Association: Inspection of works plant, Pontypridd. Three paperettes by student members.

Feb. 16.—Junior Institution of Engineers: 'Modern Practice in the Manufacture of Town Gas,' L. J. Clark, 39, Victoria Street, S.W.1, 6.30 p.m.

Feb. 17.—Yorkshire Junior Gas Association: 'Concerning Carbonisation,' R. K. Atkinson, Wakefield.

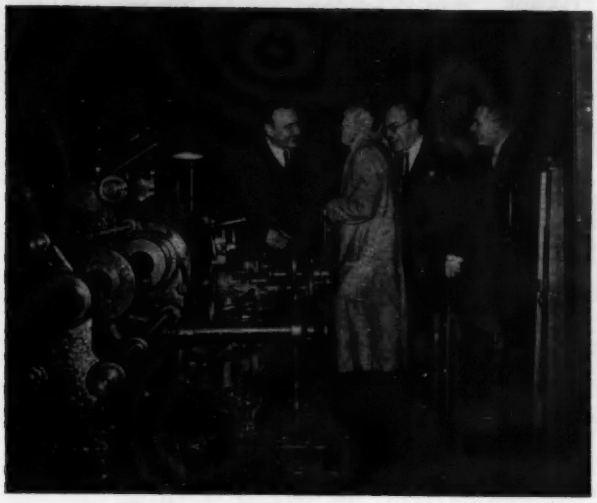
Feb. 17.—Scottish Junior Gas Association (Western District): Afternoon visit to the cement works of the Coltness Iron Co., Newmains, Wishaw.

Feb. 17.—Manchester District Junior Association of Gas Engineers: Visit to the works of the Selas Gas and Engineering Co., Ltd., Manchester. Short papers for the F. Johnson Prize.

Feb. 19.—Institute of Fuel: Paper by Dr. W. T. K. Braunholtz, King's College, Newcastle-upon-Tyne, 6.30 p.m.

Feb. 19.—Royal Society of Arts.: Cantor Lecture on 'Training for the Professions,' by Sir Harold Howitt and T. E. Scott, John Adam Street, Adelphi, W.C.2, 6 p.m.

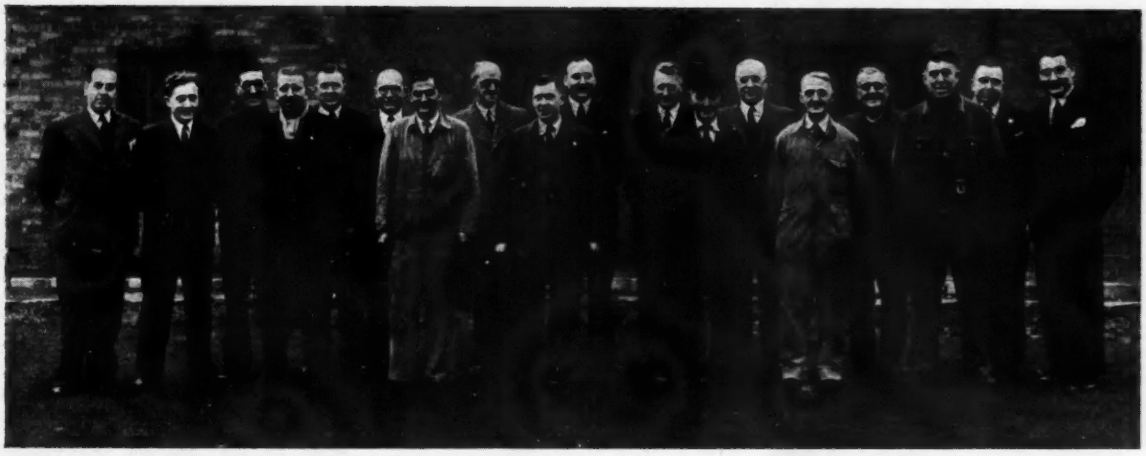
Feb. 21.—Institute of Fuel and Society of Chemical Industry: Joint meeting, 'Britain's Fuel Policy,' Sir Claude D. Gibb, Chemistry Theatre, Leeds University, 6 p.m.



Mr. Robens enjoys a joke with one of the capstan operators.

Mr. Alfred Robens at Retford

Mr. Alfred Robens, M.P., Parliamentary Secretary to the Ministry of Fuel and Power, visited the works of Messrs. W. J. Jenkins & Co., Ltd., Retford, Notts., on January 16. He was accompanied by Mr. J. S. Smith, O.B.E., Assistant Secretary, Gas Division, and by Mr. J. O'Connell, Mr. Robens' personal Secretary. Mr. Robens was welcomed by the Chairman and Directors, and then visited every department, commencing in the schemes and contracts drawing offices and progressing right through the shops. During his tour he met and talked to departmental heads, foremen, shop stewards, and many of the workmen and apprentices. Mr. Robens saw work in progress for intermittent vertical chamber oven installations, coal and coke handling and coke screening plants, and De Brouwer stoking machines. He was interested to learn that over 90% of Jenkins' production is for the national industries controlled by the Ministry of Fuel and Power, and in particular the gas industry. He showed great interest in the Company's profit-sharing scheme in which every employee of the Company participates, and also in the apprentice training system. At the close of his visit he expressed his pleasure in finding such a happy relationship between management and workpeople.



The above photograph taken during the visit of the Parliamentary Secretary to the Ministry of Fuel and Power to the Retford works of W. J. Jenkins and Co., Ltd., shows Mr. Alfred Robens with a composite group, including Mr. J. S. Smith, O.B.E., Assistant Secretary, Gas Division, Ministry of Fuel and Power; Mr. Gervass L. Ford, Chairman; R. M. Goodman, Managing Director, Messrs. W. Morland Fox, B. Pollard, and R. W. Crowther, Directors, Mr. J. Whyatt, Works Manager, of W. J. Jenkins, and the shop stewards.

News in Brief

Mr. R. Wooley, after nearly 50 years' service with the Nottingham undertaking, was presented with a wallet and money on his retirement as District Inspector at the Woodborough Road depôt. The presentation was made by Mr. P. Bowman, Fittings Superintendent.

The Trade Statistics for September, 1950, issued by the Central Statistics Office in Ireland, show imports of 19,649 tons of gas coal, valued at £83,594, as against 19,966 tons, valued at £89,639, in September, 1949. This brings the total of these imports for the first nine months of 1950 to 167,620 tons, valued at £775,069, compared with 185,492 tons in the corresponding period of 1949.

Alderman Eden Johnston, former Mayor of Sunderland, has been appointed a member of the Northern Gas Consultative Council. Alderman Johnston already sits on the North East Electricity Consultative Council and it is intended that he should act in a liaison capacity between the two bodies.

The Annual Dinner and Dance of the Combustion Engineering Association will be held at the Dorchester Hotel on March 15 at 7 for 7.30 p.m. (dancing until 1.30 a.m., buffet supper at 11.15 p.m.). Application for tickets (50s. each) should be addressed to the Secretary at 24, Tottenham Court Road, London, W.1.

Fatal Accident.—Mr. W. G. Turner, a joiner, was blown to his death from a high scaffolding at the new gasworks under construction at Tingley for the North Eastern Gas Board. Mr. Turner was employed by the Woodall-Duckham Company. Work on the site was stopped for the day after the accident.

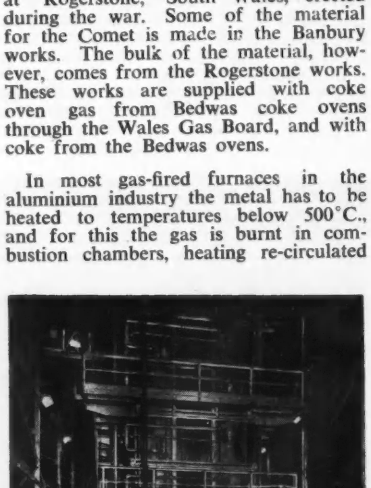
Nottingham Industrialists who were given gas for central heating and processing at special rates by the corporation gas undertaking to encourage the sale of gas, have been harshly treated by the East Midland Gas Board, it was alleged by Mr. J. G. McMeeking at a recent meeting of the Nottingham Chamber of Commerce.

GAS AND THE COMET

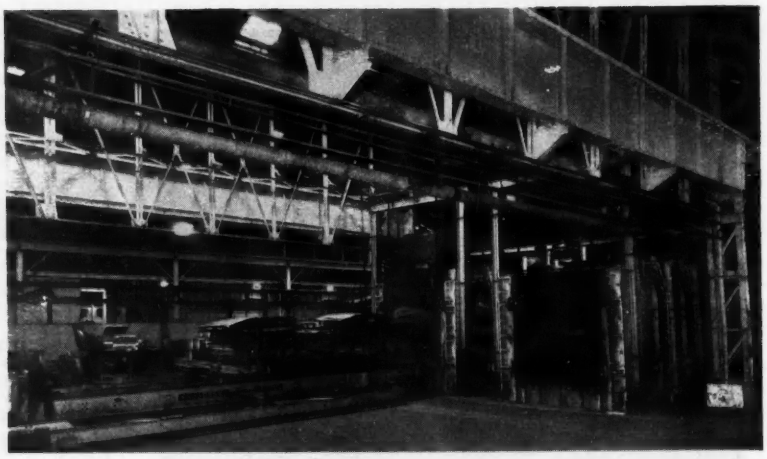
THE Comet air-liner, a revolution in aircraft design, is doubly gas-propelled, for town gas is used in considerable quantities in the manufacture of the aluminium and its alloys that form the main structure.

Practically all the aluminium used in the frame of this machine and all the material for which specially close manufacturing tolerances are demanded were supplied by Northern Aluminium Co., Ltd. This Company operates two works, one at Banbury, Oxon, and a larger one at Rogerstone, South Wales, erected during the war. Some of the material for the Comet is made in the Banbury works. The bulk of the material, however, comes from the Rogerstone works. These works are supplied with coke oven gas from Bedwas coke ovens through the Wales Gas Board, and with coke from the Bedwas ovens.

In most gas-fired furnaces in the aluminium industry the metal has to be heated to temperatures below 500°C., and for this the gas is burnt in combustion chambers, heating re-circulated waste gases which are then, at a moderate temperature, passed over the stock to be heated.



Preheating furnaces treating aluminium ingots 38 in. × 48 in. × 8 in. at the rate of five tons an hour.



Two slab annealing furnaces made by Priest Furnaces, Ltd., each approximately 38 ft. long × 8 ft. wide × 7 ft. high.

Of the 38 re-melt furnaces at Rogerstone, three of the most recent were designed by the Wellman Smith Owen Engineering Corporation, Ltd., and deliver 1½ tons of molten metal an hour. They are particularly noteworthy as being of the double-bath type, having a main melting bath and smaller holding bath from which molten metal is drawn. These units are now virtually two furnaces contained within the same casing, both being separately gas fired and both having exhaust flues which deliver to a common stack. Two large Wellman Basequip burners capable of burning 30,000 cu.ft. of gas an hour heat the melting bath and two similar burners of 5,000 cu.ft. an hour maintain the temperature in the holding bath.

There is a battery of 12 reverberatory fixed hearth melting furnaces by Priest Furnaces, Ltd., and Gibbons Brothers, Ltd., at the East works, and a further 13 similar furnaces at the West works. Each has a normal capacity of 10/15 tons and is designed for coke firing on a special grate at one end of the furnace. For small melts there are also six gas-fired tilting-hearth furnaces.

Four of the annealing furnaces were installed by Priest Furnaces, Ltd. They are approximately 38 ft. long by 8 ft. wide by 7 ft. high, fired by clean gas. These furnaces are heated by low-pressure turbulent gas burners disposed along each side below the heating chamber, burning into vertical combustion chambers which distribute heat uniformly over the side walls. The practice is to use on these furnaces a mixture of coke oven and producer gas.

The new continuous hot-rolling line at Rogerstone is served by two Priest gas-fired preheating furnaces capable of accommodating ingots with a maximum size of 8½ in. × 48 in. × 96 in. For annealing cold-rolled coils in this new mill there is a large gas-fired air circulation furnace, built by Priest Furnaces, which can anneal up to 7½ tons of metal per hour, consuming gas at the rate of 60,000 cu.ft. per hour in the process.

The quantity of gas used on this works when in full production is 750,000 cu.ft. per hour, made up of 45,000 cu.ft. of coke oven gas and 705,000 cu.ft. of producer gas, the mixture having a calorific value of 180-200 B.Th.U. About a third of the furnace firing in the works is done by gas, and the remainder by 2,500 tons of metallurgical coke a month. By a mutual arrangement between the Company and the coke ovens, the Company takes with the coke a basic supply of 40,000 cu.ft. an hour of coke oven gas, additional quantities being supplied at a higher price. The producer plants are Power Gas units operating on local anthracite beans or nuts.

Gas Officers' Guild

A meeting of the members of the Gas Officers' Guild in the area of the South Eastern Gas Board, to form a South Eastern Branch of the Guild, will be held at the Grosvenor Hotel, Victoria Station, London, S.W.1, on January 30, at 5.30 p.m. An address will be given by the Executive Chairman, Mr. J. R. W. Alexander.

Members of the Guild in that area and others eligible for membership—officers and senior or professionally qualified employees of the Board—are invited to attend.

The Annual General Meeting of the Guild will be held in London on May 29, 1951.

STREET LIGHTING ECONOMIES

THE Minister of Transport has appealed to street lighting authorities to co-operate in the Government's campaign to save fuel by securing the greatest possible economies in street lighting that can be achieved without undue risk.

It was suggested that the best plan in most areas would be to extinguish all lighting during a period when the lack of it would lead to least danger to road users and least difficulty to the police in the execution of their duties. In most areas it would be appropriate to turn off all lighting at 11 p.m., with necessary exceptions, for example, in streets where lighting is required for purposes of essential work. In some areas an earlier turn off might be practicable.

In a letter to lighting authorities it was pointed out that no cut in lighting should be made during the period when the danger of road accidents is greatest, that is, in the early hours of the evening and particularly around the hour of dusk. When traffic routes are lighted, lighting should be maintained at the full standard without any turning out of alternate lamps, reduction of the power of lamps, or other similar measures. Local authorities were asked to put their economy measures into effect as soon as possible.

Exhibition for Brighton Hoteliers

THE gas catering load in Brighton is impressive, and the figure continues to increase. The widespread adoption of gas for cooking in hotels, restaurants, and boarding houses is the result not only of the unique suitability of gas for this exacting purpose, but also the degree of co-operation and helpfulness which exists between catering managements and the gas undertaking. It was to cement further that friendship that the South Eastern Gas Board invited prominent members of the catering profession to the opening of an exhibition of large-scale cooking equipment at the showrooms in Church Street on January 15.

Opening the proceedings from the chair, Mr. **H. B. Collins** (Sales and Service Manager of the Brighton undertaking) remarked that a lot of things had happened since the last occasion on which a similar gathering had been held—not least among them the fact that the gas industry had become publicly owned. Fortunately there was still a vast amount of flexibility and local autonomy left to them, so that they could continue to give a high degree of service to the consumer. They had been anxious to retain that which was good, things which were introduced when Mr. P. E. Browne controlled the undertaking; thus the consumers had the best of two worlds. They were particularly anxious to foster the goodwill of the traders in the community, for without them, the undertaking would not be worth much. He was encouraged by the presence at the gathering of Mr. S. B. Till and Mr. G. H. Cobley, because it signified the interest of the commercial and professional life of the community from which the gas undertaking's basic prosperity was largely derived.

To Encourage Goodwill

Mr. **G. H. Cobley,** J.P., President of the Brighton and Hove Chamber of Commerce and Trade, remarked that the Chamber which he represented was always anxious to link itself with any enterprise of this nature—although such enterprises were usually privately owned. The thing which had most impressed him was the main reason for the exhibition, which was not merely to sell appliances, which were likely to be in short supply anyway, but rather to encourage goodwill and good fellowship between the gas board and its consumers. It was a pity there was not more of this goodwill in these troublous times, and he congratulated the board on its action.

Mr. Cobley was supported by Mr. **S. B. Till,** J.P., President of the Brighton and Hove Hotels and Restaurants' Association. Knowing that the hotels, restaurants, and boarding houses in the Brighton area were heavy consumers of Gas, said Mr. Till, it was pleasant to be able to record the good service they had received in the past. It reflected great credit on the organisation that the changeover had been effected without hitch—at least as far as the consumers were concerned. Before vesting day the standard of service enjoyed had been as high as any in the country, and it was gratifying to note that it was being maintained. At his own hotel, the Metropole, the furnaces for the Turkish bath had recently been replaced and gas installed; now the solid fuel ranges were being replaced, and again gas was the chosen fuel. So he could speak from some experience, and could wholeheartedly wish the exhibition success.

After Mr. Collins had introduced some of the Board's senior officers to the gathering (they included Mr. V. W. Stanton, Commercial Manager, and Mr. A. B. Seton, Sales Manager, and of the Sussex division, Mr. C. R. M. Croft, General Manager, and Mr. J. M. Webber, Engineer), Mr. **Croft** said something of the growth of gas in the area.

The word 'service,' he said, was the backbone of their endeavour. They were confident that they could offer a good product and could make it do anything which required heat, but that alone was useless without service. Fuel economy went against the grain of the commercial man, but he had the satisfaction, as had the consumers, of knowing that in gas the maximum use was made of the nation's wealth. The increased demand for gas had made necessary the new works being built at Portslade, and the opportunity had been taken of putting down plant in accordance with up-to-date practice. This would result in higher efficiency and improved working conditions, and emulating the example set by the electricity industry, the works would not be an eyesore. Moreover, they had respected the convenience of the residential areas in the line of the prevailing wind, and he could assure householders that such troubles as now existed would be eliminated in time, and in addition, their gas supply and service would be better.

The exhibition itself was held on the first floor and although no particular effort had been made at attractive presentation, an interesting range of appliances was on view. Among those noted were a de luxe tea point and a Piccadilly café set by W. M. Still & Sons, Ltd., a Dawson washing machine, a Stott sterilising sink, and the following Radiation appliances—a No. 40/3 convector pastry oven, a 5-ft. Belgravia hot closet, a No. 27 'C' pattern Savoy griller, a No. 2/2 Ward hot closet, a Chester combination range, a Savoy Minor griller, a No. 507 Chester range, a double oven Grosvenor range, a No. 4158 Keswick steamer, a No. 1324 stockpot stand, a No. 507 Chester boiling table, and a No. 3324 roasting oven.

This exhibition of catering appliances was really only part of a general exhibition showing all forms of gas appliances. In the main foyer of the showroom was quite an elaborate exhibit with four sections, dealing with cooking, water heating, space heating, and refrigeration respectively. With an attractive striped canopy, concealed lighting, etc., this constituted an ample reward for passers-by who had been encouraged to enter by the large placards on the front of the building.

GAS AT PRODUCTIVITY EXHIBITION

A Productivity Exhibition organised by the Midland Regional Board for Industry was opened in Birmingham by Mr. H. T. N. Gaitskell (Chancellor of the Exchequer) on December 29. Our photograph shows the display of the West Midlands Gas Board, which was designed to illustrate the extremely wide range of gas application to industries within their area, including firing of pottery ware, general heat treatment, steel forging, metal cutting, and canteen equipment, together with a comprehensive selection of typical burners used in gas furnace practice.

CONSULTATIVE COUNCILS IN SESSION

Cut-Throat Electricity *v.* Gas Competition

Eastern Council Seeks a National Directive

ANOTHER example of 'cut-throat' competition was reported to the Eastern Gas Consultative Council at its meeting in London on January 15, under the chairmanship of Alderman R. Turner, J.P. The minutes of the Cambridge Divisional Committee revealed that the local gas undertaking had quoted £400 for the laying of mains to 53 council houses at Huntingdon, which the Council rejected on the grounds that the electricity authority was prepared to put in a supply free of charge provided electric cookers were installed in all houses.

The outcome was that when the gas undertaking was advised of the position it promptly agreed to waive its charge for laying mains. This provided scope for considerable discussion by Council members on the subject of competition in general between the two nationalised industries. Having regard to the necessity for increased loads to cover capital expenditure it was felt that competition of this kind would become keener and that some national policy in the shape of a directive at high level should be forthcoming to avoid senseless throat-cutting and preserve the consumers' freedom of choice.

It was the policy in some areas, when the tenant of a new council house called for the key, to ensure that the representatives of both gas and electricity undertakings called together so that neither could take any unfair advantage of the other.

Admission of the Press

The question of admitting the Press to divisional committee meetings came up for further consideration—the majority of the committees in this area being in favour of such action. The Chairman indicated that the Minister of Fuel and Power took the view that uniformity of practice throughout the country was desirable in this matter, and since there was still some weight of opinion in other areas against such procedure, he thought it unlikely that the Minister would consent to any amendment to standing orders for the time being, but rather that Press statements should be issued after meetings.

After some discussion, it was resolved to ask the Minister to alter standing orders to permit of the Press being admitted to divisional committee meetings.

Towards Tariff Uniformity

A letter was received from a North London consumer pointing out that a two-part tariff was apparently available only to consumers in council houses and asking for such facilities to be extended to other classes of consumer. The Chairman stated that the Board was not at the moment prepared to extend the scope of the scheme, but that the whole question of uniformity of tariffs was coming under review and an announcement would be made in the near future.

A request for a special tariff was received from a small iron foundry at Stowmarket on the grounds that for six months in the year its output was devoted exclusively to the export market. The firm argued that it was paying one-third more for its gas than in the nearby town of Ipswich, and its application to the Board having been turned down it appealed to the Consultative Council through the Eastern Regional Board for Industry. The Chairman quoted figures for the cost of gas into holder at Stowmarket and indicated that the firm was already getting its gas 21% cheaper than the flat rate in the town and that there were probably certain other advantages accruing to the firm as a result of its foundry being sited in a smaller town. The Council agreed with the action taken by the Board in this instance.

It was reported that a monthly bulletin on new projects was to be issued by the Eastern Gas Board and that copies would be available to all members of the Council and to the Press.

In view of the Board's early consideration of the question of uniformity of tariffs throughout the area, the Council resolved to set up a special tariffs committee consisting of the chairmen of the five divisional committees. This was, said the Chairman, the most difficult task with which they had yet been faced, particularly in view of the substantial number of small units in the area producing gas at different prices, and it was most important that the Council should be taken very fully into consultation before a decision was reached. The tariffs committee would in due course receive details of all the 444 tariffs at present in operation.

On the subject of publicity, it was announced that all local authorities were being asked to display the Council's poster in their offices, in public libraries, and other suitable places. The suggestion was also made that the work of consultative councils should form the subject of a B.B.C. broadcast.

The next meeting of the council was fixed for March 19.

South Western Improvements Delayed

Smoke Emission at Wellington

Mr. L. P. Ingram, Deputy General Manager, South Western Gas Board, told a meeting of the Taunton Local Committee of the South Western Gas Consultative Council on January 12, that he had looked into complaints about the Wellington gasworks and he was satisfied that the works was not responsible for the emission of grit. Smoke was discharged not only by the gasworks but from other industrial establishments in the district. Abatement would follow from the closing of the works as a production centre in due course, but in view of the age and condition of the plant no improvement could be effected in the meantime.

Replying to questions about improvements in local gas distribution, Mr. Ingram said that unexpected delays, outside the control and not to the interests of the Board, had occurred in laying the new main between Yeovil and Montacute. It was hoped the work would be completed by the end of March. The main between Langport and Long Sutton was progressing satisfactorily.

Questioned about gas pressure at Chard and Ilminster, Mr. Ingram said the Board was not aware that pressures generally were unsatisfactory and wished to be informed of localities or premises where the supply was not good.

In reply to questions about gas quality Mr. Ingram explained the legal obligations laid on the Board to supply gas of a consistent calorific value. The responsibility for testing the gas rested with the Ministry of Fuel and Power, who appointed its own examiners for the purpose. Where gas was supplied and sold on a calorific basis the variation in quality was negligible as there was efficient control at the works.

Reporting local representations made regarding the price of gas supplied to a baker, Councillor A. W. Loveys, who presided, said he thought that the introduction of an attractive new industrial tariff would come within the next three months.

The Board would also introduce a common form of account throughout the area. On the back of it would be given all the information likely to be required by the consumer in connection with the charges for which it was a demand. The ensuing centralisation of billing and the use of special machines would effect economies in administration.

When the accuracy of a meter had been challenged by a consumer and on test by the Ministry of Fuel and Power had been found correct, the charge to the consumer would be 7s. 6d. There would be no charge if the meter was not registering accurately.

More Complaints Against Northern Charges

THE Northern Gas Consultative Council at its meeting in Newcastle on January 16 had before it four letters of complaint in respect of the new gas charges. The letters were from Middlesbrough and Blyth Divisions' Consumer Committees and from the Town Clerks of Stockton and Carlisle.

The Blyth complaint was in the terms of the following resolution, which had been passed by the Committee: 'Blyth Division Consumer Committee endorses the Consultative Council's action in approving the Board's new charges for gas with the proviso that the consultative council takes up the question of the new scale of charges for non-domestic meter rents with the area board. The committee points out that the revised charges for small-capacity meters inflict hardship on traders who use only a small quantity of gas quarterly and who therefore not only pay increased charges for gas but also an increased charge for meter rent. The Committee suggests that meters of 250 cu.ft. capacity per hour, and, below should be classified as domestic meters on which no rental is charged.'

Alderman Joseph Hoy, chairman of the Council, explained that although rentals previously charged for ordinary meters in *domestic* premises were abolished and were now included in the new basis of charge, this did not apply to meters in non-domestic premises. The Northern Gas Board was attempting to unify charges for such meters throughout the area and to that end had drawn up a new scale of charges. Unfortunately, the charge hitherto made in Blyth for such meters was very much below an economic level so that the new rentals represented a substantial increase. In other divisions, where a realistic charge had always been made, there was no complaint. The new charge was 3% per quarter of today's buying price—a figure which barely met the interest and upkeep costs over the average life of a meter. If the Board were to grant this concession, it would have to apply to the whole of the area and not to the Blyth Division alone, and the Board would thereby face a considerable loss of revenue.

Part of the Gas Charge

Ald. P. M. Williams (Hartlepool) said it seemed to him that a great number of complaints would be avoided if the Board regarded the meters as part of the whole charge to be paid by consumers. This would have done away with complaint by people in such places as the Hartlepools, where not only had gas charges risen steeply but there was the additional charge on meters.

It was decided to place these matters before the Board for investigation. It was also agreed that Ald. Hoy should take up with the Board the complaint contained in the letter from Middlesbrough Division Consumer Committee. This expressed dissatisfaction with the price fixed by the Board for the installation of new domestic appliances. The Committee asked the Council to investigate why a charge of £2 should be made for such installation. It was pointed out that the charge was uniform throughout the division and was designed to cover transport charges as well as maintenance. Transport was a costly item because of the special care which had to be taken in handling expensive equipment. Several members thought the charge excessive for what was in some cases just a five-minutes job.

The Carlisle complaint stated that the Corporation Finance Committee was concerned at the nature of the gas charge increases which were approximately 25% on top of the existing rates. The Council approved Ald. Hoy's reply to the effect that the Carlisle Council had direct representation on the appropriate consumer committee and that the increases were not passed in any light manner by that committee. The increases resulted from matters outside the control of the industry.

From Stockton Corporation came a protest against the supplementary charges of one penny on every therm of gas supplied in respect of prepayment meters. The Corporation contended that the supplementary charge would be disproportionate to the charges made on quarterly meters and would fall most heavily on consumers who could least afford it.

An Overall Problem

Ald. Hoy reported that he had replied stating that the Corporation was correct in saying the problem was one affecting the whole of the area. He would place the matter before his Council and report on their findings. Ald. Hoy gave comparisons of charges in Stockton with those in other areas of the Board and said that they showed that Stockton Division was not so hard hit as was implied in their letter.

He reported that since September he had visited consumer committees in Carlisle, Sunderland, Workington, Darlington, Middlesbrough and Blyth and had endeavoured to explain to them the Board's action in increasing charges. 'I would like to say that it has been very pleasing to hear in almost every division praise of the improvements which have been taking place, particularly in the more remote areas, and of the efforts which have been made to bring the less efficient undertakings up to standard of the better ones,' he continued. 'This is particularly true in the Cleveland unit of the Middlesbrough Division, where, I understand, there have been splendid results in supply and service for consumers.'

After considerable discussion the Council agreed that it could not see its way clear to advise the Board to take any immediate action as a result of strong protests against the new gas charges from a Penrith deputation but that it would review the whole matter in 12 months' time. Before Ald. Hoy read the Council's decision, Mrs. A. W. Wakefield, a member of Penrith Division Consumer Committee and representative on the Council of Women's Organisations in her district, said the small consumer was going to carry the heaviest load, and it seemed to her that it would not be beyond the Board to devise some means of spreading the cost so that the small consumer would have some favourable consideration.

Ald Hoy again cited comparisons with charges imposed upon neighbouring districts and said that they made it obvious that the new rates in Penrith were not so exorbitant as they might appear.

Mr. R. N. Carr (Carlisle) raised the question of pressure and quality of gas throughout the area. He felt that as these varied so much from unit to unit the time had arrived when the Board should use its endeavours to have them stabilised throughout the area. The chairman replied that he would have to seek the advice of the chairman of the Board on such issues.

South Eastern Council

Address by Deputy Chairman of Board

The sixth quarterly meeting of the South Eastern Gas Consultative Council was held on January 2, at Katharine Street, Croydon, under the chairmanship of Alderman A. C. Warwick, J.P.

The Council was addressed by Mr. R. S. Johnson, M.B.E., M.A., LL.B., deputy Chairman of the Board. Mr. Johnson referred to the large increases in gas output during recent weeks, which, in normal circumstances, would be very gratifying. He reminded the Council of the statements made by the Minister of Fuel and Power on the coal supply position, and said that the South Eastern Gas Board, in common with the rest of the gas industry, had done everything possible to save coal by the use of gas oil, appealed to the public to be economical in the use of gas and above all to avoid waste. Efficiency in the use of gas was equally important, and the Board's technical staff were at all times available to advise and assist consumers to that end.

Appreciation was expressed of a display of modern appliances, arranged by Mr. V. W. Stanton, the Board's Commercial Manager, for the benefit of Council members, the only note of regret being that while refrigerators were continually being displayed, so few were available to meet the long waiting list known to be recorded.

Other matters dealt with included the question of alleviation of purchase tax, the exercise of option to local authorities' tenants in the use of either gas or electricity, or both; the prospect of increased revenue from the sale of coke, and the responsibility of consumers for financial loss due to automatic meters being broken open. In the latter case the Board had ruled that certain latitude should be allowed in applying the rules governing the terms of supply in circumstances involving hardship to a consumer.

The meeting was adjourned until February 6.

TRADE NEWS

Robert Dempster & Sons, Ltd.

The annual presentation of prizes to apprentices of Robert Dempster & Sons, Ltd., Elland, took place recently, when the apprentices were entertained at dinner by the Managing Director, Mr. B. C. Morton, supported by the Company's Apprentice Committee.

Mr. Morton presenting a prize.

Mr. Morton indicated in his presentation address that boys at a very early age showed signs of engineering interest in their facility for taking things apart and re-assembling them; also this natural gift became evident in an inclination towards railways and aeroplanes. It was therefore the engineering industry's primary responsibility, so far as the apprentices were concerned, to harness their natural aptitude and initiative to the most suitable trades or professions. Engineering ranked amongst the most important national industries in peace and war, and in this age of mechanisation, engineering knowledge was invaluable to men.

It was recalled by Mr. Morton that in the past few years the apprentices' results in their courses at Technical Colleges had been disappointing. This had prompted him to reorganise the firm's apprenticeship scheme, and by means of a probationary training period assist apprentices towards deciding on the particular branch of engineering for which they are most suited. Mr. Morton emphasised that all the best positions were not necessarily held by those wearing white collars, and equal opportunity for advancement was available in the practical field; indeed, modern trends towards systematic works' management and control, to which the firm was fully alive, opened up new scope which had hitherto not been realised by youth. Erection work was a field in which supervisory control had been developed in recent years beyond all comparison to the relatively primitive methods of a past generation, and he recommended the interest of the boys in that direction.

In a final note Mr. Morton expressed concern that boys of today were not sufficiently ambitious. There was need for a high aim in life that would reach beyond a monotonous routine. He emphased when presenting the prizes that from the apprentices of today there would emanate the firm's executives of tomorrow. Because of this, promise was given that there would be frequent functions of this character to allow more intimate contact between the management and the apprentices, so that the latter would be fully assured that their individual progress was being carefully observed, and their vital place in the firm recognised.

The apprentices gave a programme of entertainment, and two of them expressed thanks to the Managing Director and the firm for the special facilities arranged for their training and for the evening's entertainment.

Prize-winners were: Peter B. Dean, Gordon Heap, Eric Slide, G. Slater, G. W. Barnard, J. D. Robinson, P. J. Ames and Donald Hardy.

Hackbridge and Hewittic Electric Co., Ltd.

We have received a brochure describing variable speed machine drives with Hewittic 'Velotrol' rectifiers.

The Hewittic 'Velotrol' is a development of the Hewittic glass bulb rectifier and comprises the normal transformer and rectifier together with the control gear, and it enables the armature voltage and field current of shunt connected D.C. motors to be varied either independently or together to give smooth speed variation over ranges of up to 50:1 or greater if required.

The rectifiers are made for operation on any A.C. supply in types to suit most industrial variable speed drives. Each type is designed for the particular application and, in contrast with some equipments which require the use of oversized motors to avoid excessive armature heating, the Hewittic 'Velotrol' operates with any standard D.C. motor—thereby ensuring high overall efficiency both in operation and maintenance.

It is explained in the brochure that the 'Velotrol' rectifier is purely electronic in action. Nothing is consumed within the bulb, which continues to operate indefinitely without the need for periodical replacement, and, as no filaments are used, a warming-up period is not necessary, so that the bulb can be switched immediately on to load.

Due to its electronic action, the equipment is entirely free from vibration, mechanical wear, and the continued maintenance associated with other forms of converting equipment. Being static in operation, it requires no special foundations and, further, its construction enables easy installation without the need for overhead crane facilities. Also its flexibility of arrangement permits advantageous positioning of the equipment to suit existing buildings or awkward sites.

Whessoe Ltd.

During 1950 Whessoe Ltd. continued to receive a steady flow of orders for gas plant for home and overseas customers. Complete schemes for condensation and wet purification plant for the gas industry have been brought to the fore by the Royal opening of the East Greenwich plant. This plant comprises multiple condensers, electro-detarrers, static scrubbers, reheaters, and ancillaries, and is designed to treat 31 mill. cu.ft. per day. It is thus probably the largest of its type in the country. Work has been started on another important wet purification plant for Swan Village (Birmingham).

Orders have been received for major contracts of this type for Glasgow, Wrexham, Odense (Denmark), and Southall (London), bringing the total completed or in hand to 13. In addition the Woodall-Duckham Company has placed orders with Whessoe for condensing and detarring plant for the N.C.B.'s Fishburn coking installation. In certain of these contracts, notably Fishburn and Wrexham, gasholders are included. Whessoe is also to supply an all-welded holder for Bishop Auckland which will have a capacity of 3 mill. cu.ft. Among high pressure holders completed, that at Longbridge (Birmingham) was commissioned just in time for the Christmas peak loads. This holder is over 200 ft. in length and has a releasable volume of nearly 500,000 cu.ft.—probably the largest welded holder of its kind in Europe.

Unit plant contracts have been received for many gasworks and coking plants at home and in Australia, New Zealand, Turkey, China, Holland, Denmark, and the Channel Islands. They include orders for electro-detarrers, condensers, and static scrubbers.

During the visit of the North of England Gas Managers' Association to the works in the autumn of 1950, a laboratory scale dynamic purifier was shown for the first time. It is hoped that a prototype unit may be in operation at a gasworks in the not too distant future.

With the present demand for steel, it is interesting to note the completion and putting into operation of a 6 mill. cu.ft./hr. blast-furnace gas cleaning plant for Messrs. Colvilles in Scotland.

Cochran & Co., Annan, Ltd.

A new publication (No. 73), 'Cochran Boiler Illustrated,' has been produced. It contains three pages of tables and the remainder is devoted to a photographic record of some of their installations at home and overseas. It has been designed to whet the appetite and induce the reader to seek more information.

R. & J. Dempster, Ltd., announce that to the best of their knowledge they have now supplied date cards for 1951 to all the known owners of the desk calendars which they have issued in earlier years but due to the many changes which have occurred during the past year or two, there may be some who have not yet received the necessary refill cards. Should that be so, the firm will gladly do their best to rectify the omission if they will communicate with them.

C. H. Johnson (Machinery), Ltd.

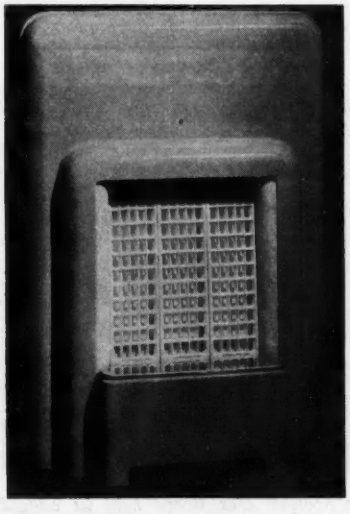
The new Johnson 'Hylo-Veyor' is being supplied to the National Coal Board and gas boards for the handling of coal, coke and oxide, etc., for stock piling and reclaiming: also for the feeding of de-breezing and scalping screens, and has a capacity of between 50 and 60 tons per hour for coke and 80 tons per hour for coal. It can be fitted with a large hopper to take the discharge from mechanical shovel, or a portable hopper on four caster wheels. Small gravity bar screens for de-breezing and scalping can be fitted.

The patented self-cleaning bottom drum prevents any build-up of material between the drum and underside of the belt. Probably one of the most important features of this 'Hylo-Veyor' is the overhang between wheels and discharge points—*i.e.*, two-thirds of the boom's length.

A further important feature is the use of alloys for various brackets, thus allowing the weight of a machine of 48 ft. centres to be kept below three tons. This gives extreme mobility. Drives can be electric motor, petrol or diesel engine.

Bratt Colbran, Ltd.

The 'Camelot,' the latest neat burner model in the Portcullis range, has been designed to fill the demand for a low-priced fire. Omission of the automatic lighter and integral tap help this. It is finished in beige stone enamel with a Birmabright reflector. It has three radiants and the overall dimensions are: Height, 26 in. and width 19 in. Minimum wall opening height, 19¼ in. and width 12 in.



Elliott Bros. (London), Ltd.

There are many industrial requirements for a specific oxygen analyser which will give a continuous indication and chart record of the oxygen content of a gas and which may be used with a controller for maintaining the oxygen content at a given value. The DCL-Elliott oxygen analyser meets this need by utilising the para-magnetic properties possessed by oxygen. The principle has long been established in the laboratory and has now been applied to an industrial instrument, the design of which follows original development work carried out by the Research and Development Department of the Distillers Co., Ltd., by arrangement with whom, this new Elliott equipment is now introduced into the commercial field.

It was shown by Faraday nearly a century ago that when a glass test-piece of dumb-bell shape was suspended in an inhomogeneous magnetic field, the position taken up by the piece was dependent on the amount of oxygen in the surrounding gas. In the Elliott instrument a quartz test-piece of special design is used, suspended from a torsion head in a cell arranged between the poles of a powerful magnet. Movement of the test-piece is measured by a reflector and photo-electric system, the amplified output of which operates an Elliottronic recorder which may be coupled to an Elliottrol controller to exercise automatic control over an industrial process. The equipment is particularly robust and will withstand the vibration often associated with industrial applications.

Careful design of the cell and the provision of a sampling system which continuously passes relatively large quantities of gas and thus ensures movement through the sampling pipelines, has reduced the time lag to the order of 10 to 12 sec. In operation the analyser is automatic after setting up the zero by the use of a non-paramagnetic gas (such as nitrogen obtained by washing air in chromous chloride) and standardisation to compensate for barometric changes is effected automatically at 30 min. intervals.

The instrument reads directly in percentage of oxygen and is available in standard ranges 0-2%, 0-25% and 0-100% for full travel of recorder span. It is suitable for the estimation of oxygen in hydrocarbon gases, in combustion products, and similar applications.

Details of the instrument are given in Publication G.147, which may be obtained on request from Elliott Brothers.

Verrolec, Ltd.

A new electrically or pneumatically-operated Portable Automatic Pipe Saw which cuts cast iron or steel pipes of 8 in. to 56 in. dia., leaving a clean and smooth edge. The saw is of particular advantage for repair work under most difficult conditions, where space is limited and speed important. It consists of two parts: cutter and chain. Two unskilled men can set the machine in 3 to 5 min. It automatically moves along the surface of the pipe, while a carbon or high speed blade of approximately 6 ft. 5 in. dia. does its work. The ends of the cut will join together even if the surface is only reasonably clean. The use of hammer and chisel is eliminated. The cutting time for a cast iron pipe of 24 in. dia. is approximately 30 min. and of a steel pipe of the same dia. approximately 37 min.

Lancashire Dynamo & Crypto

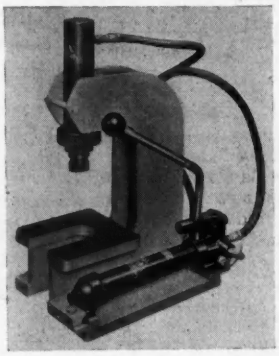
A new company has been formed which will operate and ultimately acquire the manufacturing business at present operated at Lancashire Dynamo & Crypto. It has been given the title of Lancashire Dynamo and Crypto (Mfg.) and has a capital of £100,000 in £1 shares. This development is a sequel to the extraordinary meeting of Lancashire Dynamo & Crypto on December 28, at which it was decided to change the company's name to Lancashire Dynamo Holdings. It is pointed out that since

that company was formed in 1899, it has, in addition to developing its own business acquired a number of subsidiaries which now represent a considerable part of the business. The directors came to the conclusion that substantial administrative advantages would be achieved if the parent company became a holding company and its manufacturing business were operated by a subsidiary formed for that purpose.

On the advice of the company's lawyers, the directors have decided that the parent company and the new 'Mfg.' subsidiary should trade as a partnership, as from January 1, 1951, in the name of Lancashire Dynamo and Crypto.

Chamberlain Industries, Ltd.

The latest accessory for the Hydroram Repair Kit consists of a 5-ton hydraulically-operated Arbor Press, robustly fabricated, of ample proportions from mild steel. The Standard Hydroram Pump and Ram Unit can be fitted within a matter of minutes to provide the power source, and the press is suitable for handling all classes of light assembly work covering bending, straightening, clamping and shearing.



Specification :—Max. load: 5 ton. Overall dimensions 21 in. by 14 in. by 11 in. Max. Ram Stroke: 6 in. Daylight opening: 6½ in. Ram travel per stroke: $\frac{1}{16}$ in. Size work table: 7½ in. sq.

Turner's Asbestos Cement

Despite an unprecedented labour shortage Turner Brothers Asbestos Company is making a special effort to repeat its record output of 1948. The factory is now running almost round the clock. To meet the big demand for asbestos yarn the men in the carding and spinning departments are working a 55-hour week, and the night shift is working on Sunday nights as well as overtime, making a 60-hour week. Special measures include the operation of spinning and doubling frames by charge hands and servicing personnel in overtime hours, in place of the regular women workers. Similar efforts are being made in other departments, including weaving and those manufacturing jointings and packings. In several sections women are working overtime and in tape weaving a special evening shift of women has been recruited. To cope with the output the warehouse department is also working well over a 50-hour week.

Cambridge Instrument Co. Ltd.

Folder No. 65A, newly published, deals with the latest types of Cambridge mercury-in-steel thermometers, for indicating or recording at a distance the temperatures in a wide variety of applications up to 1,000° F. or 600° F. They are made with 4 in., 6 in., or 8 in. dials.

Richard Sutcliffe, Ltd.

We have received the latest publication describing mechanical handling equipment, profuse with coloured illustrations and folding plates. Many of the pictures and some of the details refer specifically to the mining industry. The components are incorporated in industrial installations in factories and gasworks where belt conveyors and accessories are used. Copies are obtainable from Richard Sutcliffe, Ltd., on request.

Midland Tar Distillers' Expansion

PRESIDING at the 28th annual meeting of the Midland Tar Distillers. Ltd., at Oldbury on January 12, Mr. Stanley J. L. Robinson, the Chairman, recalled that a year ago he told the proprietors that the Company's crude tar distillation capacity was being increased by the addition of another large continuous unit. The work, he now announced, was progressing well, and much needed relief would be afforded when the unit came into operation by the end of the present year.

Negotiations for a 90-acre site had been successfully concluded and development of 30 acres was well under way. The first unit will soon be in operation and further units will follow before very long. It is hoped, provided rearmament does not hold up progress, that by the end of 1952 the scheme will be well on the way to completion.

During the year the Company continued to refine a small quantity of crude benzole; it had converted part of the plant to other uses and was in a position to re-convert when the time came; that was when coal and plant became more easily available to the gas undertakings, making it possible for them to resume the production of crude benzole.

The merits of tar for road maintenance was now well established, which meant that the Company was assured of a stable and subsequent market.

Nowadays, things were very different from what they used to be. Whereas formerly the distiller used to send off his tar in barrels generally by rail, and service on the roadside was largely limited to investigating complaints, today the distiller had to meet various exacting requirements. Tars were of many specifications and often had to be delivered hot in bulk by road tankers to places as far distant as 50 miles away ready for the contractors to start work early in the morning. Deliveries were followed with full technical after-sales service backed up with a travelling laboratory.

The Company had spent a considerable sum on the development of its road tanker fleet and garage. The department responsible for routing and maintaining these lorries was doing a very good job of work and the saving which the department showed over the cost of hiring lorries, fully justified the expenditure. In addition, the Company had increased the number of rail tanks which were largely used in the conveyance of crude tar and creosote.

Business in the liquid fuel market had continued to give satisfaction to customers, judging by the fact that there had been few, if any, complaints, and that they could sell considerably more if supplies were available.

The Edinburgh District Social Club of the Scottish Gas Board held its annual whist drive and dance in the Assembly Rooms, George Street, Edinburgh, on January 4, when between 700 and 800 employees and their friends attended. In the absence through illness of the Chairman of the Board (Sir Andrew Clow), the company were welcomed by Mr. David Beavis, Engineer and Manager. Principal guests included Lady Clow, Mr. D. D. Burns (Deputy Chairman of the Board), Mr. D. D. Melvin and Mr. C. Murdoch (Members), Mr. A. T. Herd (Secretary), Dr. J. G. Davidson (Chief Financial Officer), and other senior officials. The function, which is now in its third year, proved an outstanding success.

PERFORMANCE OF CONTINUOUS VERTICAL RETORTS

By C. H. LEWIS, M.Sc., M.Inst.Gas E.,

North Thames Gas Board.

The former Gas Light and Coke Company became interested in the performance of continuous vertical retorts in 1907, and that interest, now vested in the North Thames Gas Board, continues to the present day. In this paper to the London and Southern Junior Gas Association, on January 12, are summarised the more important results obtained in certain performance tests carried out over a period of 27 years by the Research Department of that undertaking, while the connection between the design of the retorts and the results obtained are indicated.

THE normal process of development has resulted in changes in design of all types of carbonising plant, and in the carrying out of performance tests the ultimate aim has always been to correlate performance with design in such a way as to indicate the most favourable course for future development. It is important to realise that these tests are designed to determine with precision the actual performance of the plant under normal working conditions, and that no artificial conditions are introduced. Plant routine and supervision are in no way modified for the test, but precise measurements of such factors as coal and fuel supplies, producer efficiency, gas leakage, etc., which are not normally available in day-to-day working results, are carried out. In the interest of brevity, only one of the continuous vertical retort systems can be dealt with in the present paper, and in view of the long historical association of the Gas Light and Coke Company with the development of the Woodall-Duckham system, this system has been selected for discussion.

Before proceeding to give details of results obtained, it must be pointed out that, in general, tests carried out on different plants will refer to different conditions of coal type, calorific value, steam input, etc. It is therefore necessary to adopt some system of co-ordination whereby all results may be reduced to a common basis.

Coal Carbonised

Variation in ash and moisture content obviously affects the thermal yield per ton of coal carbonised, and this can be allowed for by a simple arithmetical correction to a standard 'ash plus moisture' content. For this purpose a total 'ash plus moisture' figure of 8% has been adopted as a standard basis. The effect of variation in coal rank is, however, more difficult to eliminate.

The difference in behaviour of Yorkshire and Durham coals in continuous vertical retorts is so marked that no numerical co-ordination is possible, and it is difficult to imagine any basis on which tests carried out on these two types of coal could be compared. It is therefore necessary to establish two sets of data in suitable cases, one referring to Durham coals and one to Yorkshire coals.

Even then there are large variations, more particularly among the inland coals, for which no precise method of co-ordination of gas-making results is available. It is, however, fortunate that such Yorkshire coals as were carbonised in the Gas Light and Coke Company's works prior to 1940 did not exhibit significant differences; it is only when considering results obtained after about 1946 that this problem assumes serious proportions.

Calorific Value of Gas

The calorific value of the gas produced depends to some extent on the design of the plant and on the coal carbonised, but to an even greater extent on the steam admitted to the retorts. The well-known 'Hydro-carbon Enrichment Value' introduced by Dr. Pexton provides a ready means of eliminating the effects of dilution with water gas and inert constituents, and if the H.E.V. be multiplied by a factor of 2.374, a figure which will be referred to as 'Equivalent Thermal Yield' is derived. This is the thermal yield of gas with a calorific value of 500 B.Th.U./cu.ft. and containing 9% inerts to be obtained by dilution with blue water gas. The H.E.V. figure employed for the calculation is derived from the yield per ton of coal containing 8% ash plus moisture and the derivation of the factor 2.374 is explained in Dr. Pexton's paper[1].

Since the H.E.V. is dependent on the coal carbonised and on cracking conditions, which are largely controlled by the design of the plant, the Equivalent Thermal Yield provides a simple means of comparing gas-making results.

The gross coke and breeze yield is not of major importance in the present discussion, but is influenced to some extent by the rate of steaming. The reduction in gross yield due to gasification of carbon in the retorts can be calculated stoichiometrically; each therm of water gas produced involves the gasification of approximately 5 lb. of carbon. The determined gross yield of coke and breeze is, therefore, corrected to a standard basis by deducting a weight equivalent to 5 lb. for each therm by which the Equivalent Thermal Yield exceeds the determined thermal yield. For this purpose both figures should be on the basis of 'coal as charged.'

Fuel Consumption

Since the fuel consumption depends on design factors, coal throughput and steam admission, while these factors are simultaneously interdependent, some care is required in comparing the results from different installations.

Consider, for example a retort system carbonising coal containing 10% ash plus moisture, and producing 72 therms of gas with a calorific value of 525 B.Th.U./cu.ft.; assume the fuel consumption to be 2.5 cwt. per ton, and the H.E.V. to be 32.0: what would be the fuel consumption if the retorts were steamed to produce 500 B.Th.U. gas?

As a result of tests carried out by the Fuel Research Board[2] and the Gas Investigation Committee[3] it is generally agreed that steaming in excess of about 5% entails a fuel consumption per therm of water gas which is at least as great as that per therm of coal gas. If exact equivalence be assumed, the fuel consumption per therm of gas produced in a given plant is independent of the steaming rate. In the example given above, the fuel consumption is $\frac{2.5 \times 112}{72} = 3.89$ lb/therm, and the Equivalent Thermal Yield at C.V. = 500 is $32.0 \times 2.374 =$ 75.97 therms per ton of coal as charged. The fuel requirement for the production of 500 B.Th.U. gas should, therefore, be $\frac{75.97 \times 3.89}{112} = 2.64$ cwt. per ton of coal

If prior to carbonisation the total ash plus moisture content of the coal were reduced to 8% by partial drying and cleaning, the thermal yield would be $\frac{92 \times 72.0}{90} = 73.6$ therms per ton of coal. The effect on fuel consumption is rather complex, for if the coal throughput were kept constant the loss of heat as sensible heat of coke would be substantially un-

changed while owing to the increased output the loss as sensible heat of crude gas would be increased. The radiation and convection losses per hour are clearly constant, and the losses per ton would, therefore, be increased. On the other hand, if the throughput of coal were reduced to keep the thermal output constant, the loss of sensible heat in coke would be reduced and the other losses would remain unchanged. If the 2% of inert constituents removed consisted entirely of water, the loss by evaporation of this water from the coal would be reduced, while if they consisted entirely of ash the calorific value of the producer fuel would be increased.

On balance, therefore, it seems reasonable to assume that, within limits, the fuel consumption is not materially affected by small changes in the ash and moisture content of the coal charged. The Equivalent Fuel Consumption used for comparison purposes in this paper is, therefore, calculated from the Equivalent Thermal Yield and the fuel requirement per therm of gas made from coal containing 8% ash plus moisture in the manner indicated above.

The thermal efficiency of a modern step-grate producer as used on continuous vertical retort settings is fairly constant at almost 90% and variations in producer efficiency are not taken into consideration for the purposes of this discussion. The calorific value of the fuel supplied is, however, in part dependent on the ash content, and this may vary widely according to the breeze content of the fuel. As it is the Board's usual practice to debreeze the coke supplied to the producers, it has been thought advisable further to correct fuel figures to a 10% ash basis where necessary.

The introduction of the concept of Equivalent Thermal Yield ignores the fact that if the steaming rate be increased in order to reduce the calorific value, the throughput must be correspondingly reduced. No attempt is made to correct for this factor; but in certain cases it is necessary to compare installations operating at different throughputs. This applies especially to cases where it is considered that the fuel consumption is affected by throughput.

Early History

The first Woodall-Duckham patent was taken out in 1903[4] and the first experimental settings were tested at the Bournemouth Gas and Water Company's works between the years 1903 and 1907[5 6 7]. In the latter year, the Gas Light and Coke Company's first setting of W-D retorts was erected at the Nine Elms works[8] and this installation carbonising Birley Silkstone coal, produced 12,633 cu.ft. of crude gas with a calorific value of 593.8 B.Th.U./cu.ft. as determined by Boys calorimeter. The inerts content of the gas was 8.8%, and the thermal yield calculated from these results is 75.0 therms per ton, *with an H.E.V. of 38.4 therms per ton.* By modern standards this is a remarkable performance, especially as it was stated that 'the coal carbonised was wet, having been stored for some months in the open, and no allowance was made for its water content.' This setting incorporated a 'water pond' in which the base of the retorts was sealed, and coke was extracted by means of a conveyor working in this water pond.

A second setting was constructed at Nine Elms in 1908 [9]. and this incorporated what was virtually the present type of coke extractor, although the coke discharger was of a different design. This installation was so successful that the first large commercial installation was ordered by the Gas Light and Coke Company for their Kensal Green works, and went to work in 1909. It may be of interest to record that the London and Southern Junior Gas Association visited Kensal Green works on January 16, 1909 [10] and inspected the foundations of this installation while under construction, and that a further visit was made on February 10, 1912[11]. The results published at that visit were not quite so good as those obtained at Nine Elms; carbonising Aldwarke coal the yield appears to have been 71.2 therms per ton at a calorific value of 539.6 B.Th.U./cu.ft. The calorific value is low for this type of installation, but as it was quoted in calories and the method of determination was not referred to, it is possible that the published figures are not comparable with those to which we are accustomed.

The installation comprised 36 oval retorts, 25 ft. high, 21 in. by 9 in. at the top and 29 in. by 21 in. at the bottom. The coal feed valves were mechanically operated, as were the coke extractors and coke discharge doors. The latter were in effect enlarged versions of the coal valve. The bench included one setting of two rectangular retorts—the forerunners of the modern type—54 in. by 9 in. at the top expanding to 66 in. by 18 in. at the bottom.

Development at this time was rapid, for in 1911 J. P. Leather[12] gave details of an installation at Burnley constructed entirely with rectangular retorts, two of which were fitted with the present-day type of water-sealed discharge doors. His paper includes a drawing of an installation at Lausanne fitted exclusively with such doors. Results from the Lausanne plant published in 1911[13] included data from a test run on Aldwarke nuts which yielded 79.4 therms of gas with a calorific value of 605 B.Th.U./cu.ft. The fuel consumption was 15.1%, but it would seem that gas coals gave considerably higher yields than at the present day!

The Kensal Green installation was reconstructed in 1912 with rectangular retorts, and by this time the standard setting comprised four retorts with a producer between two of the retorts and a recuperator between the other two. The producer charging hole was on the level of the top stage. The 'downward heating' system was firmly established, and until 1912 the minor axis taper was uniform throughout the retort. In that year, however, it was decided that as the bulk of the coal was converted into coke in the upper half of the retort the taper should be concentrated in the upper portion of the retort while the lower portion should be constructed with parallel walls. This decision was of major importance to the present discussion, as was the tendency to reduce the major axis taper, culminating in its virtual disappearance during the period 1926-31.

The practice of steaming the retorts, introduced during the 1914-18 war, was generally adopted after the passage of the Gas Regulation Act of 1920, and this no doubt had some influence on the design of the retorts.

Unique Installation

Many Woodall-Duckham plants were erected all over the world during the years following the construction of the Kensal Green plant, and by 1926 the Gas Light and Coke Company possessed five full-scale installations of Woodall-Duckham retorts, all differing in one or more particulars. One of these, now demolished, was at the old Brentford Gas Company's Southall works, and three were at Kensal Green. The Kensal Green settings, like those at Southall, were recuperative. They would have been demolished by 1940 but were retained on account of the war, and are in fact still at work. As a matter of interest it may be mentioned that the oldest of these three installations is unique in being fitted with dry sealed coke discharge doors. Their history is obscure; it appears that they were installed at the 1912 reconstruction, possibly by way of an experiment, and possibly because there was insufficient headroom to accommodate the water-sealed discharger together with the coke box after the abolition of the mechanically operated discharge drum. There appears to have been no previously published record of the use of this type of door in the history of the development of the Woodall-Duckham system; their survival at later reconstructions is certainly due to lack of space.

The last of the five installations was newly erected in 1926 at the Bow Common works, and was without recuperators. The producers were constructed in a separate battery, thus consolidating the setting and minimising the effect of thermal strain, while waste heat boilers were fitted to recover heat from the waste gases. This was the largest installation, comprising 68 retorts of 80 in. major axis, and marks the beginning of the modern phase of development.

The first reliable test results available in the North Thames Gas Board's records were obtained during 1924 on No. 2

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HEREFORD *(Third Installation)*	23
HUDDERSFIELD	189
MARGATE *(Third Installation)*	55
NOTTINGHAM *(Third Installation)*	141
NOTTINGHAM *(Fourth Installation)*	141
NEWTON-ON-AYR	25
NEWMARKET *(Third Installation)*	11
OLDHAM *(Third Installation)*	122
POOLE *(Seventh Installation)*	237
PAISLEY *(Third Installation)*	69
REDDITCH *(Third Installation)*	46
CHESTER *(Third Installation)*	66

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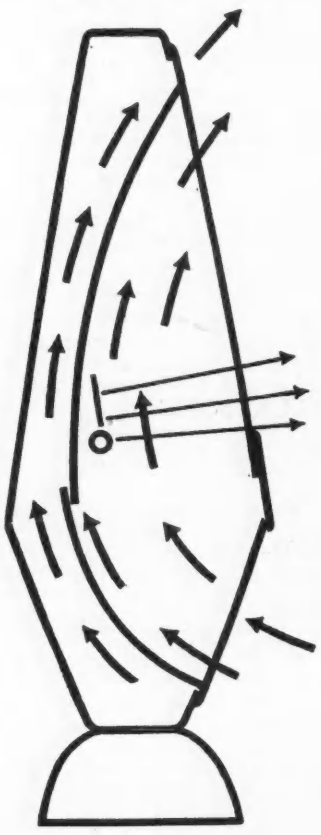

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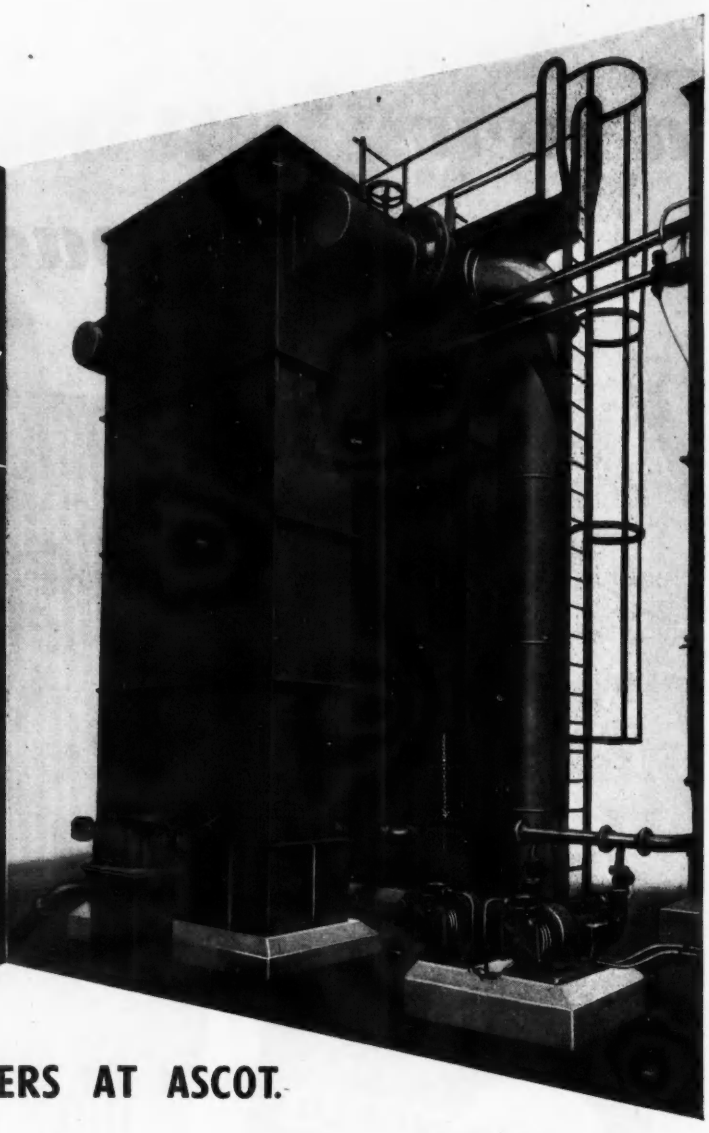

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installation at Kensal Green. The test lasted for three weeks, during which a mixture of Elsecar and Thorncliffe coals was carbonised. The coal throughput was 3.92 tons per retort per day, the gas yield 77.6 therms per ton of coal containing 8% ash plus moisture, and the calorific value of the gas 495.3 B.Th.U./cu.ft. Fuel consumption was equivalent to 3.98 lb. per therm of gas; the Equivalent Thermal Yield was 80.4 therms per ton and the Equivalent Fuel Consumption 14.1%.

Disappointment with these results was expressed at the time; both retort throughput and thermal yield were lower than previous experience indicated. It appears that during a reconstruction preceding the test the major axis of the retorts was increased by about 5 in. while the original coal boxes were retained. In consequence the sloping surface of the coal entering the retort coked under the influence of radiated heat, and this led to difficulties with coal travel, while the larger free space led to over-cracking.

The three old installations at Kensal Green normally give an Equivalent Thermal Yield of about 84 therms per ton when carbonising a mixture of Yorkshire and Durham coals, with a fuel consumption of 3.81 lb. per therm, equivalent to 14.3%. The retorts in these installations were originally of the same shape, but Nos. 2 and 3 installations were modified in 1931/32.

The Bow Common installation built in 1926 incorporated retorts of 80 in. major axis, and, as already indicated, was not recuperative. The test results obtained in 1928 showed a yield of 79.2 therms per ton of Yorkshire coal, containing 8% ash plus moisture, with a calorific value of 510.1. The fuel consumption was 3.69 lb. per therm, the Equivalent Thermal Yield was 81.9 therms per ton, and the Equivalent Fuel Consumption 13.6%.

PERFORMANCE TEST RESULTS.

TABLE I—YORKSHIRE COALS.

Installation	Kensal Green No. 2	Bow Common 1926	Kensal Green No. 4	Bow Common No. 1	Bow Common No. 2
Retort size and heating system	62in. Downward	80in. Downward	Twin 44 in. Lambent	82 in. Lambent	82 in. Lambent
Coal—Tons per gas-making retort per day	3.92	8.40	9.00	8.51	9.30
moisture + ash content, %	10.90	9.00	10.48	9.03	12.14
Gas—Thermal yield per ton coal as charged	75.2	78.4	76.5	72.5	72.4
" " containing 8% moisture + ash	77.6	79.2	78.6	73.3	75.8
Therms per gas-making retort per day	295	658	688	617	673
Calorific value, B.Th.U./cu. ft.	495.3	510.1	541.1	536.0	535.5
Total inerts, %	12.2	9.5	10.0	7.9	9.2
H.E.V. therms per ton coal as charged	32.8	34.1	35.5	33.6	33.4
" " containing 8% moisture + ash	33.9	34.5	36.4	34.0	35.0
Dry Fuel to Producers % of coal as charged	13.8	13.03	9.95	1.13	9.17
lb. per therm of gas from coal containing 8% moisture + ash	3.98	3.69	2.84	3.10	2.71
Equivalent Thermal Yield of gas with C.V. = 500 and 9% inerts per ton of coal containing 8% moisture + ash	80.4	81.9	86.4	80.7	83.0
Equivalent Consumption of Fuel with 10% ash; % of coal containing 8% moisture + ash for production of gas with C.V. = 500 and 9% inerts	14.1	13.6	11.1	11.4	10.4
Tar Yield, gal. per ton coal as charged	—	12.5	13.0	13.7	14.9
Waste Heat Steam from and at 212°F. lb./ton coal	—	1410	1,075	1,100	1,119

By comparison with the older Kensal Green installations, the Bow Common plant of 1928 gave a slightly lower thermal yield, but with a definitely lower fuel consumption. The fuel figure is at first sight surprising since a non-recuperative setting would be expected to be thermally less efficient. However, the secondary air in this type of setting was still preheated to some extent by passage through horizontal flues at the base of the retorts and thus recovered some of the heat otherwise lost in the coke. At the same time the superficial area of the setting per ton of coal carbonised was reduced, partly by the more compact design made possible by the absence of recuperators, and partly in this case by the larger size of the retorts. Thus No. 2 installation at Kensal Green carbonised 95 tons of coal per day with a superficial area of 10,500 sq.ft., while the Bow Common plant carbonised 270 tons per day with a superficial area of 12,800 sq.ft. The surface areas per ton of coal carbonised per day were 110 sq.ft. for Kensal Green, and 47 sq.ft. for Bow Common, including the producer battery, from which the losses are less than from the setting proper.

The many advantages of continuous vertical retorts led to trials by the Fuel Research Board, and at Ellesmere Port, on the carbonisation of Durham coals in this type of plant, and these proved so successful that a downwardly heated W-D installation was constructed at the Fulham works with the express intention of carbonising run-of-mine Durham coals. In order to secure the maximum economy in working the retorts were of the largest size—103 in. major axis—but otherwise the installation was similar to that at Bow Common. The first bench of 36 retorts was tested in 1931, shortly after being put to work, and gave most disappointing results. The Equivalent Thermal Yield was only 76.9 therms per ton and the Equivalent Fuel Consumption 14.2%. The primary trouble appeared to be erratic coal travel; the retorts could only be kept in action by an unusual amount of top and bottom rodding. By reference to Table II, which shows results obtained in various tests with Durham coals, it will be seen that the throughput per retort per day was only 9.36 tons, as compared with a designed throughput of 10 tons per day. A further test in 1932, after more experience had been gained in operating the plant, did not prove much more encouraging, and taking all the available evidence into consideration it began to appear as if the larger retorts produced a lower thermal yield. It will be remembered that the 80 in. retorts at Bow Common gave a somewhat lower yield than the 62 in. retorts at Kensal Green.

In 1937, one of the two benches of the Fulham installation was reconstructed with the 'upward heating' system first introduced in 1928. In this arrangement the vertical heating flues are retained but the producer gas and secondary air are admitted at the bottom, waste gases being withdrawn at the top. As it was desired to operate the plant at a higher calorific value than originally in order to permit of full benzole recovery, air circulating ducts were arranged around the bottom castings, and secondary air passed through these ducts before entering the main air heating flues at the base of the retorts. By these means overheating of the bottom ironwork was avoided.

A test carried out in 1938 showed an Equivalent Thermal Yield of 75.5 therms per ton, with an Equivalent Fuel Consumption of 13.3%. The thermal yield was thus slightly worse than before, but there was a definite improvement in fuel consumption. The latter effect was not unexpected—the upward heating system, by causing the heating gases to flow countercurrent to the coal, should be more efficient than the earlier downward heating system. There are, however, complications in this instance because both throughput and calorific value of gas were higher in the 1938 test, as shown in Table II, and it is of interest to separate the effect of these factors, viz.:—

(a) Reduced steam input for production of higher C.V. gas.
(b) Increased coal throughput.
(c) More efficient heating system.

An approximate separation can be made on the following lines:—

(a) It has already been indicated that the fuel consumption per therm of gas produced in a given installation is substan-

tially independent of the calorific value of the gas and thus if the fuel requirement per therm of gas be compared the effect of steam decomposition is eliminated. The figures are 4.13 lb. and 3.92 lb. respectively, and the reduction may be attributed entirely to factors (b) and (c).

(b) The coal throughput for the bench of 36 retorts in 1931 was 320 tons per day. If it had been possible to work at the throughput attained in 1938, the corresponding figure would have been 348 tons—*i.e.*, an increase of 28 tons. If, as is generally accepted, the carbonisation process with Durham coal is thermally neutral ([14 15]), the only additional heat required for the additional throughput would be the heat losses in the coke discharged and in the crude gas produced.

Dr. Pexton([16]) has indicated the sensible and latent heat content of the coke and crude gas leaving a continuous vertical retort as being of the order of 6.0 and 3.5 therms per ton of coal carbonised. Thus the carbonisation of 28 tons of coal requires the provision of $28 \times 9.5 = 266$ therms, plus the associated losses in the waste gases. In a continuous vertical retort setting the overall heating efficiency is about 43%—that is, for every 100 therms supplied in the producer fuel 43 therms are employed in the setting, the remainder being lost in the producers and in the waste gases (*ibid*). The 43 therms include radiation and convection losses, which amount to some 30% of the heat utilised. Since no additional radiation and convection losses are incurred in respect of the additional 28 tons of coal, the overall heating efficiency for the additional coal only may be taken as $\frac{43 \times 100}{70} = 61\%$.

The provision of 266 therms for carbonisation of 28 additional tons of coal, therefore, requires an input of $\frac{266 \times 100}{61}$ = 436 therms in producer fuel. Taking the calorific value of the dry fuel as 13,000 B.Th.U. per lb., the weight of fuel required is 1.50 tons.

The 320 tons of coal carbonised in 1931 produced 24,060 therms of gas with the consumption of 44.37 tons of dry fuel, and if the throughput were increased to 348 tons the proportional gas production would have been 26,170 therms, with the consumption of 44.37 + 1.50 = 45.87 tons of fuel.

The effect of the increased throughput would, therefore, have been to reduce the fuel consumption from 4.13 lb. to 3.93 lb. per therm of gas. By a coincidence this is almost identical with the result obtained in the 1938 test, but in order to complete the comparison it is necessary to take into consideration the fact that the H.E.V. obtained in the 1938 test was lower than that obtained in 1931, and this had the effect of increasing the fuel consumed per therm of gas produced in 1938. If the H.E.V. had been 32.4 therms per ton of coal containing 8% ash plus moisture as in 1931, instead of 31.8 therms, the fuel consumption in 1938 would have been

$$\frac{3.93 \times 31.8}{32.4} = 3.86 \text{ lb. per therm.}$$

(c) The difference between the figure of 3.93 lb. per therm of gas calculated from the 1931 results and the corresponding fuel consumption of 3.86 lb. per therm calculated from the results obtained in 1938, represents the reduction in fuel consumption due to heat recovered from the bottom ironwork by the secondary air.

Summing up the results of the change from downward to upward heating in this installation, it may be said that there was an increase in coal throughput and daily thermal output together with a reduction in fuel consumption, but the H.E.V. (and in consequence the Equivalent Thermal Yield) had decreased. This last result was especially disappointing as a test in an installation of upwardly heated retorts at Bolton carbonising Durham coal had shown an H.E.V. of 33.1, a marked improvement over the Fulham results. This installation, however, was of 63 in. retorts with major axis taper, and thus in 1938 the current problem of retort size and shape began to present itself.

PERFORMANCE TEST RESULTS.

TABLE II—DURHAM COALS.

Installation	Fulham 1931	Fulham 1938	Kensal Green	Fulham 1949
Retort size and heating system	103 in. Downward	103 in. Upward	No. 4 Twin 44 in. Lambent	103 in. Downward
Coal—Tons per gas-making retort per day	9.36	10.20	8.23	10.55
moisture + ash content, %	10.9	9.0	10.74	10.15
Gas—Thermal yield per ton coal as charged	72.8	70.1	71.7	68.7
" " containing 8% moisture + ash	75.2	70.9	73.9	70.4
Therms per gas-making retort per day	681	714	590	725
Calorific value, B.Th.U./cu. ft.	512.2	525.5	536.2	544.7
Total inerts, %	8.3	8.7	8.6	8.3
H.E.V. therms per ton coal as charged	31.3	31.5	32.8	32.1
" " containing 8% moisture + ash	32.4	31.8	33.8	32.8
Dry Fuel to Producers % of coal as charged	13.85	12.40	11.10	11.75
lb. per therm of gas from coal containing 8% moisture + ash	4.13	3.92	3.36	3.74
Equivalent Thermal Yield of gas with C.V. = 500 and 9% inerts per ton of coal containing 8% moisture + ash	76.9	75.5	80.3	77.9
Equivalent Consumption of Fuel with 10% ash; % of coal containing 8% moisture + ash for production of gas with C.V. = 500 and 9% inerts	14.2	13.3	12.1	13.0
Tar Yield gal. per ton coal as charged	8.6	11.1	12.4	12.9
Waste Heat Steam from and at 212°F. lb./ton coal	—	1,025	1,045	—

The obvious inference to be drawn from the results available by 1938 was that, from the point of view of thermal yield, large retorts are at a disadvantage as compared with retorts of a smaller size. This factor was carefully considered when the designs for a new installation at Kensal Green were being prepared. There are obvious economic advantages in large retorts, and ultimately a compromise was arrived at, which it was hoped would give results similar to those obtained from small retorts with the economic advantages of a large major axis.

The new retort house (No. 4 installation) at Kensal Green was accordingly constructed with retorts of 103 in. major axis divided down the centre by a midfeather wall, making twin 44 in. retorts.

The retorts were fitted with twin coal boxes and bottom castings but only one gas offtake and one set of heating flues were used for each pair of twins. The newly developed 'lambent heating' system was introduced, and the provision for air heating in flues at the base of the retorts was increased.

When carbonising Durham coals, this plant gave an Equivalent Thermal Yield of 80.3 therms per ton with an Equivalent Fuel Consumption of 12.1%. The advantages of this design as compared with the Fulham plant are obvious, but the results with Yorkshire coals were even more striking—the Equivalent Thermal Yield was 86.4 therms per ton and the Equivalent Fuel Consumption was 11.1%. This is definitely the best thermal yield obtained in any performance test on continuous vertical retorts carried out by the former Gas Light and Coke Company or by the North Thames Gas Board.

There are of course disadvantages in the design. The mid-feather wall represents a reduction in capacity—the twin 44 in. retorts occupy as much space as a 103 in. retort, but carbonise less coal than the 1937 upwardly heated installation—and the common gas offtake system makes for difficulty if one of the 44 in. retorts 'hangs up.' Also, segregation of coal in the bunkers causes differences in the working of the two units forming the twin retort and the duplicate extractors, etc., make access to the bottom of the retorts difficult.

For these reasons, when one half (No. 1 bench) of the Bow Common installation was reconstructed in 1943, it was decided that as fairly satisfactory results had been obtained while carbonising Yorkshire coals in the original 80 in. retorts, no major change in retort size would be made. The lambent heating system which had proved so successful at Kensal Green was introduced; air preheating both in ducts round the bottom ironwork and in flues at the base of the retorts was by this time standard practice.

A performance test carried out in 1944 gave an Equivalent Thermal Yield of 80.7 therms per ton from Yorkshire Coals—*i.e.*, 1.2 therms per ton less than in 1928—and an Equivalent Fuel Consumption of 11.4%, which is not materially different from the result obtained on No. 4 installation at Kensal Green. The small drop in thermal yield may be due to the deterioration in coal quality which has been generally experienced, but it may be useful to recall that the 1928 installation had a fuel consumption of 13.6%, so that a material saving in fuel costs had been achieved. In part this is due to the characteristics of the lambent heating system, in which the flow of heating gases is countercurrent to the flow of coal, as with upward heating, but some part of the improvement is due to the arrangements made for air pre-heating.

Installations with Modified Retort Shapes

The 'twin retorts' at Kensal Green were introduced because it was felt to be impossible to keep the coal charge travelling in a 103 in. retort as one monolith, but observations of the bulk density of coke made in various installations suggested that the taper of the retorts exerted a profound influence on the behaviour of the coal charge.

Two experiments in which working retorts were rapidly quenched with water for subsequent examination of the charges ([17] [18]), coupled with observations on brick wear and distortion of the retorts, led to the adoption of the view that particularly for the carbonisation of Durham coal the minor axis taper should be continuous from top to bottom of the retort, and that some major axis taper is desirable. This is especially necessary when making gas of calorific value of 500 B.Th.U./cu.ft. or higher, since under these conditions the coal core extends almost to the extractor. The development and performance of this type of retort has been described in a paper by Dr. Burns and Dr. Weston([19]). No. 2 bench at Bow Common was reconstructed in 1947 with continuous minor axis taper, from 10 in. at the top of the retort to 20 in. at the bottom, and with 4 in. major axis taper in the upper 5 ft. 6 in. of the retort. The performance test on this plant showed an Equivalent Thermal Yield of 83.0 therms per ton, with an Equivalent Fuel Consumption of 10.4%. The Equivalent Thermal Yield is only 2.3 therms per ton higher than in No. 1 bench, but it is here necessary to take into account the fact that the coals carbonised in the 1948 test on No. 2 bench were of definitely lower rank than those employed during the test on No. 1 bench. In evidence of this it may be observed that the B.S.I. Swelling Index of the coals employed in 1948 was only 5, as compared with 7½ to 8 in the 1944 test on No. 1 bench, while the Assay Test yielded only 70.6 therms per ton from the 1948 coal. The thermal yield from the continuously tapered retort is thus a definite improvement on that from the standard design, although the magnitude of the improvement cannot be assessed.

In this particular installation the low fuel consumption of 2.71 lb. per therm of gas is perhaps of even greater interest than the effect of retort size. The net coal cost for gas production is materially affected by the fuel consumption of the carbonising plant, and the exceptionally low fuel requirement of the plant (undoubtedly the lowest in any of the Board's retort houses) represents a considerable economy in working.

In the first place, advantage was taken of developments in the field of high temperature insulation. The normal insulating bricks of diatomaceous earth or similar materials have excellent insulating properties, but their range of usefulness is limited by their low mechanical strength and an upper working temperature of about 600° C. Expanded fireclay high-temperature insulating bricks with an upper working temperature of 1,000-1,100° C. and a fairly high crushing strength are now available, although their insulating properties are somewhat inferior to those of the diatomaceous bricks.

By the judicious use of such high temperature insulating bricks as part of the normal wall construction, between the refractory lining and the facing of insulation proper, and by increasing the wall thickness, a much higher standard of insulation in the construction of retort settings is possible. In designing such insulated walls, it is necessary to bear in mind that the thickness of high temperature insulating material employed must be sufficient to prevent overheating of the low temperautre material, and that a reduction in heat losses through the wall may entail higher working temperatures of some portion of the refractory material between the hot face and the commencement of the insulating layers. The insulation of retort settings has been discussed by A. J. Dale and A. T. Green([20]).

Temperature Observations

In the construction of No. 2 bench, Bow Common, 18 in of high temperature insulating brick were substituted for 6 in. of second-quality firebrick, thus increasing the wall thickness by 12 in. Provision was made during erection for the insertion of thermo-couples in the walls at various points, and after the setting had been put to work many observations of internal wall temperatures and surface temperatures were made. The average surface temperature of both side and end walls in No. 2 bench was 50° C., whereas in the case of No. 1 bench the side walls were at 66° C. and the end walls at 72° C. The heat losses to still air at 21° C. from the side walls under these conditions were calculated as 155 B.Th.U./sq.ft./hr. for No. 1 bench and 94 B.Th.U./sq.ft./hr. for No. 2 bench. The reduction of 61 B.Th.U./sq.ft./hr. represents reduction in losses of 2.54 therms per hour, and since about 43% of the heat supplied in the fuel is utilised in the setting the reduction in fuel requirement is some 6 therms per hour, or 0.5 tons of dry coke per day. Since the fuel requirement of the bench is approximately 29 tons per day, the saving is about 1.5% of the actual fuel used, or approximately 0.04 lb. per therm of gas produced. This appears to be very small, but in the course of the life of the setting represents an economy of some £4,500 in cost of fuel, which is more than sufficient to cover the cost of the additional insulation. It is doubtful if any further increase in wall thickness could be justified, but without the extra insulation the fuel consumption of Bow Common No. 2 bench would have been 2.75 lb. per therm instead of the 2.71 lb. recorded.

The second important factor in reducing fuel consumption is the degree to which the secondary air is preheated. This technique has been applied in other instances. The average temperature of the secondary air leaving the ducts in the bottom ironwork was 278°C., and this temperature was further raised to 406°C. after passing through the preheating flues at the base of the retorts. On entering the combustion chambers, the secondary air had attained a temperature of 507°C., although a high proportion of this last increase in sensible heat may have been obtained at the expense of heat from the combustion chambers.

Taking the true heat recovery as that required to raise the air temperature to 406°C. it is possible to estimate the effect of such recovery of heat on the fuel consumption. In this installation as tested, 100 lb. of dry coke produced 20.68 lb. molecules of producer gas with a total potential and sensible heat content of 11.894 therms. The efficiency of heat utilisation in the setting was approximately 47%, so that

the effective heat utilisation was 5.59 therms. The secondary air requirement calculated from the volume and composition of the producer gas was 23.28 lb. molecules, and the sensible heat content of this air at 406°C. is 1.15 therms. The effective total heat input to the combustion chambers was therefore 6.74 therms, which would, in the absence of air preheating require the combustion of 120.6 lb. of coke. Thus, if the secondary air were not preheated the fuel consumption of the Bow Common plant would be increased by 20.6% – *i.e.*, from 2.71 to 3.27 lb. per therm. The effect of air circulation in ductwork around the bottom castings and floor joists is difficult to estimate separately, but this probably accounts for about half of the total saving in fuel from air preheat.

Finally, the effect of retort throughput must be taken into consideration, and there is no doubt that this plays an important part in establishing such a low Equivalent Fuel Consumption as in No. 2 bench, Bow Common. The possible magnitude of this effect has already been referred to in the case of No. 4 house, Fulham; a reliable estimate in the case of Bow Common is more difficult because of the lower rank of the coal now carbonised in this installation.

There is one other installation with modified retort taper in the North Thames Gas Board—*i.e.*, No. 4 house, Fulham. When this plant was reconstructed in 1946-47 it was considered that the cost of conversion to lambent heating was not justified; downward heating was therefore employed in both benches and the fact that the higher fuel consumption of the downwardly heated system was associated with a high yield of steam from the waste heat boilers, and that there was a rather high steam demand on the Fulham works, had some influence on that decision. At the same time it was found to be impossible to employ truly continuous minor axis taper. The retorts were therefore designed to expand from 9 in. to 18 in. in the upper 15 ft. 6 in. and then to 20 in. in the lower 11 ft. No major axis taper was included as the existing steelwork, etc., was to be re-used. The performance test on the installation carbonising Durham coal showed an Equivalent Thermal Yield of 77.9 therms per ton which is virtually the same as that obtained in the original downwardly heated installation. The thermal value of the volatile matter in the coke was found to be exceptionally high, at 12.25 therms per ton, equivalent to approximately 8 therms per ton of coal; the volatile matter contained a useful proportion of hydrocarbons. As a reasonable estimate at least half of this volatile matter should have appeared in the gas and the Equivalent Thermal Yield should be about 82 therms per ton. In fact the working results from this house over a period of six months showed an Equivalent Thermal Yield of 81.9 therms per ton[18].

The Equivalent Fuel Consumption was 13.0% or 3.74 lb. per therm, which is less than that obtained in the upwardly heated installation in 1938. The low fuel consumption and the high volatile therm content of the coke both result from the very high throughput—10.55 tons per retort per day, as compared with 10.2 tons for the upwardly heated retorts and 9.36 for the first downwardly heated plant. Since such high throughputs were impossible with the earlier retorts it is considered that under the conditions obtaining in the North Thames Gas Board there has been ample justification for the modification in retort taper, and the new retort house under construction at Kensal Green will include retorts with an even greater degree of taper than either the Bow Common or Fulham designs. It will remain for the future to determine whether, by modification to the shape of the retorts, the undesirable effects of a large major axis can be eliminated and thermal yields as high as those typical of smaller retorts can be obtained.

The carbonisation of coal in continuous vertical retorts at high throughputs necessarily implies that the coal core extends almost to the extractor. It will be recalled that the reason for the concentration of minor axis taper in the upper part of the retort was that the conversion of coal into coke occurs principally in the upper zone. This is undoubtedly true when producing gas of calorific value lower than 500 B.Th.U. per cu.ft. for the production of water gas in the bottom of the retort implies that the coal core must not be unduly extended. It is, however, clear that when the coal core approaches the bottom, some swelling occurs in the charge in the lower zone and the continuous minor axis taper is intended to accommodate this swelling.

In the Bow Common and Fulham installations the calorific value of the gas produced is very high and the economics of this have been discussed elsewhere[19]. The calorific value can only be reduced by a considerable reduction in throughput as with any continuous vertical retort system, but there is a special difficulty in the case of these two plants. First, in the case of No. 2 bench, Bow Common, the heated length of the retort is shortened by the increased height of the air preheating flues, which abstract heat from the coke in the steaming zone. Secondly, the minor axis dimension is 2 in. greater than normal at the bottom of the retort, so that the mean distance of the coke from the retort walls is greater than usual.

With low rates of steam admission the endothermicity of the water gas reaction is largely satisfied by the sensible heat of the coke in the lower portion of the retort, but if the steam input be increased, further production of water gas can only be attained if additional heat be delivered from the combustion chambers. The heated zone being shorter, it follows that the steaming zone must extend higher up the retort—*i.e.*, the throughput must be considerably reduced to raise the coal core. Finally, the increased mean distance of the coke from the retort walls lowers the temperature at the centre of the charge by lengthening the heat transmission path. For these reasons the modified retorts are less flexible than the standard design, but for the production of gas of high calorific value the design is very satisfactory.

There has been a tendency to reduce the distance between the centre line of the retorts and the centre of the extractor in installations intended to carbonise strongly swelling coals with the production of gas at high calorific value. In this way the slope of the back-plate of the extractor casing becomes steeper and discharge of the coke is easier. In retorts where the bottom major axis dimension is increased the extractor is placed even nearer the centre line of the retort. No data can be given on the effect of this change, as there are no standards for comparison.

Further information is required on the travel of the coal charge in continuous vertical retorts before any final conclusions can be reached, and future developments cannot be foreseen. It seems unlikely that any material reduction in fuel consumption will be attained by additional insulation or preheating of secondary air.

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(A report of the discussion which followed Mr. Lewis's paper will be published in a subsequent issue.)

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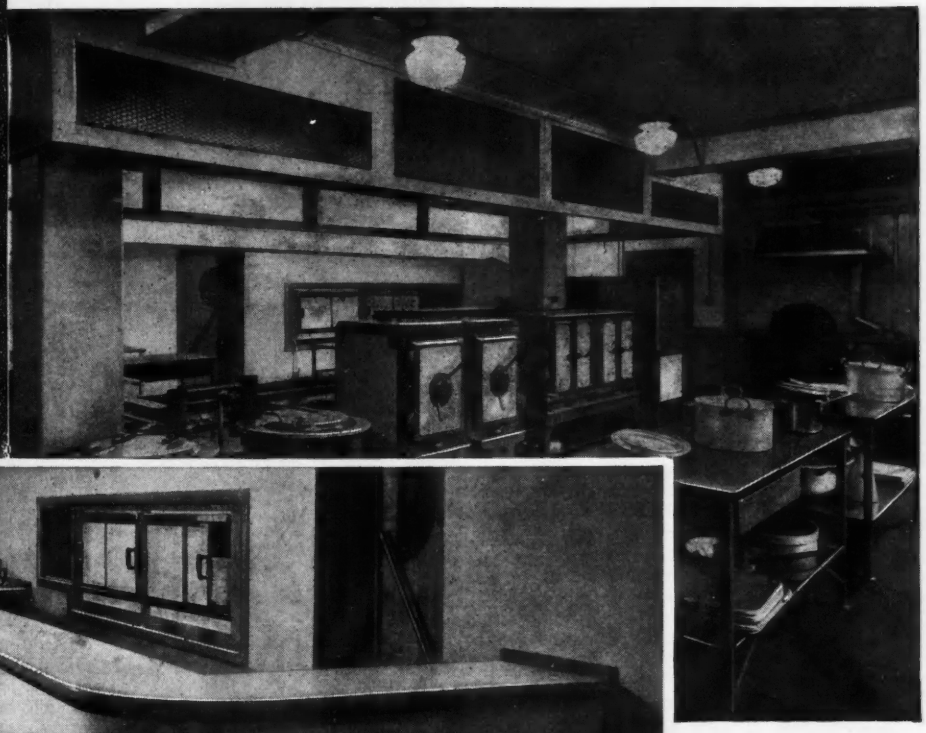

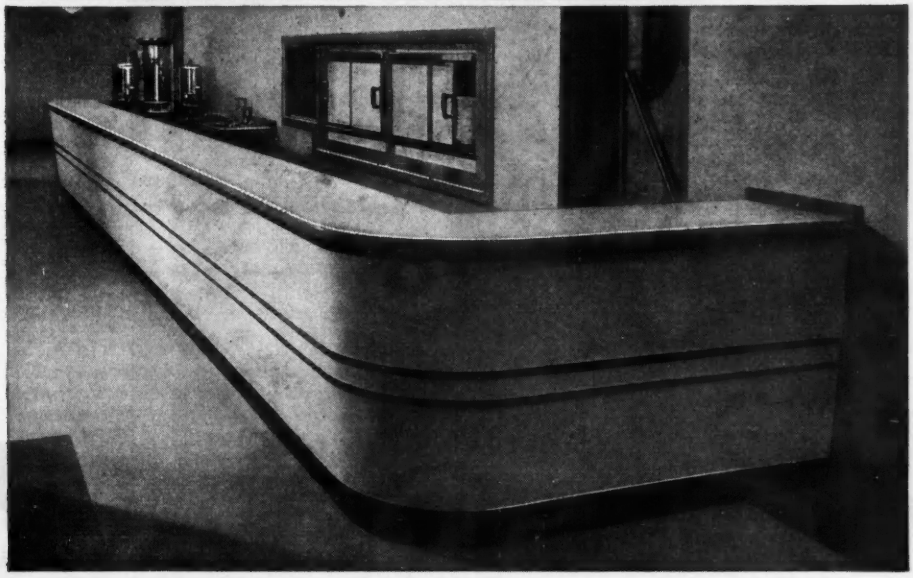

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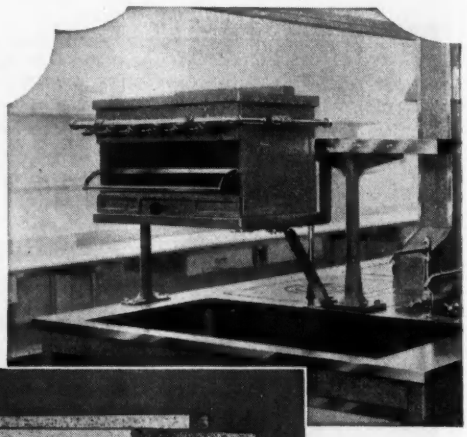

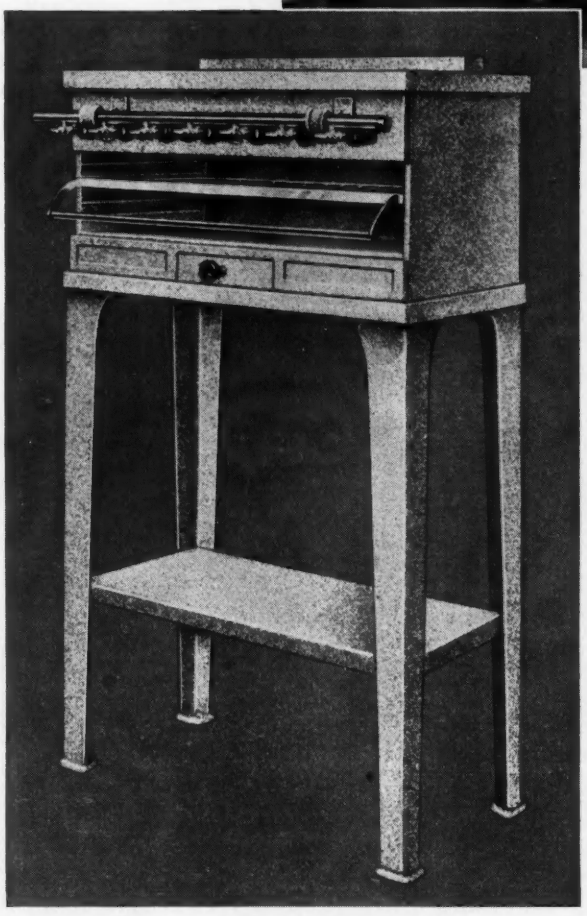

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TEMPERATURE SURVEY ON A CONTINUOUS VERTICAL RETORT*

By J. LAMING.

A PREVIOUS temperature survey of a continuous vertical retort was instrumental in establishing the temperature conditions obtaining near the carbonising face at three selected levels in a retort of elliptical cross-section. Temperatures in all cases were recorded at one end of the minor axis at two positions within the retort wall, the first being approximately ¼ in. from the carbonising face, and the second ⅜ in. from the flue face, thus giving an indication of the temperature gradients obtaining through the retort wall. It was found that the average temperatures during the working period at ¼ in. from the carbonising face were 1,000°, 920° and 680°C. at 17, 9 and 3 ft., respectively, from the top of the retort. The average lateral temperature gradients through 3 in. of the retort wall were about 150°C. at 17 ft., and 200°C. at 9 and 3 ft. Temperature variations during the working period were quite large, amounting to 200°C. at the two lowest positions, and 450°C. at the top of the retort.

The present temperature survey had two objects in view. Firstly, it was realised that the results obtained in the first survey related to only one retort at one gasworks, and that, therefore, the effect of differences in retort operation and design could not be assessed; neither was it possible to state whether these results were representative. It was very desirable, therefore, to verify the findings of the first survey. Secondly, it is almost invariably found, when flaking occurs in a continuous vertical retort, that its severity is at a maximum at the ends of the minor axis, and at a minimum, or even non-existent, at the ends of the major axis. It was thought possible that some difference in average temperature or of temperature range might account for these observed differences in flaking tendency, and that a temperature survey could provide information on that point.

Procedure

The retort chosen for this second survey was of the same size and type as in the earlier survey, but employed a different system of coke extraction and was differently placed in the setting, being a 'corner' retort. This was necessary in view of the fact that thermo-couple sheaths were to be placed at one end of both minor and major axes at one level. It was originally planned to build four thermo-couple sheaths into the retort—*i.e.*, to repeat the procedure of the first survey with the addition of an extra position at the end of the major axis at the 9 ft. level. As the result of breakages, however, only three suitable thermo-couple sheaths were available, and measurements at the 17 ft. level were omitted. The three positions at which temperatures were measured were as follows:—

Position A.—3 ft. from the top of the retort at the end of the minor axis.

Position B.—9 ft. from the top of the retort at the end of the minor axis.

Position C.—9 ft. from the top of the retort at the non-offtake end of the major axis.

Position A was at a level where disintegration of the top refractory is sometimes observed. Positions B and C were approximately at the level at which flaking is most pronounced.

The method of mounting the thermo-couple sheaths was similar to that employed in the first survey. The appropriate retort sections, with ¼ in. dia. holes drilled from carbonising to flue faces, were set in position. Sheaths of mullite composition, ⅜ in. outside dia., were cemented into these holes by means of silicon carbide cement, the closed ends of the sheaths being set flush with the carbonising face. To allow for the differential expansion between the retort and the outside wall, a 4½ in. sq. hole was cut through the outside wall brickwork at each position. These holes were made good with high-temperature insulating brick and pointing cement after the temperature at each position had risen above 600°C. and after the bulk of the thermal expansion of the retort, which was of silica material, had taken place.

Two platinum—platinum 13% rhodium thermo-couples having a common positive lead were inserted in each sheath, with the hot junctions 3 in. apart, being so arranged that one was situated approximately ¼ in. from the carbonising face and the other ⅜ in. from the flue face. The retort wall at position C was, of course, backed by solid brickwork. The term 'flue face' should, therefore, be taken in this case to refer to the outside face of the retort wall. Connections were made from the cold junction of each couple to a six-point recorder by means of compensating leads.

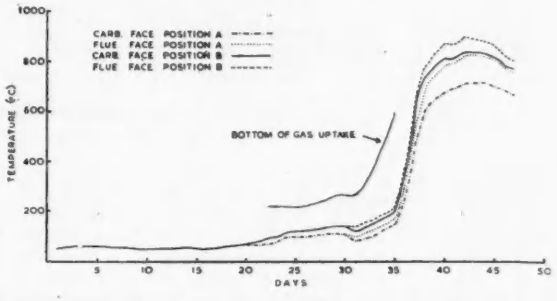

Fig. 1.—Retort and Gas Uptake Temperatures during Heating-up.

A continuous record of temperature at 4½ min. intervals at all six points was obtained from six days after lighting slow fires in the producers until the end of 5½ months of gas making, the survey being eventually terminated by the breakage of two sets of thermo-couples inside the sheaths, thus making it impossible to insert new thermo-couples. After 2½ months' gas-making, the sheath at position C was found to have fractured. It was still possible, however, to remove and replace the thermo-couples, though these were found to deteriorate rapidly now they were exposed to the flue gases. Occasional check calibrations were carried out on both recorder and thermo-couples, and in consequence it can be stated with some confidence, that the limits of accuracy of the temperature measurement were of the order of ±10°C.

Heating-up Period

The heating-up period was of course characterised by a gradual building up of fires in the producer so that the temperature rose slowly at first, followed by a relatively rapid rise after gaseous firing commenced. It was the practice during the pre-gaseous firing period to measure temperatures at the bottom of the producer gas uptake at both producer

* From the 41st Report of the Refractory Materials Joint Committee of the Gas Research Board and the British Ceramics Research Association (G.B.R. Communication No. 58)

and non-producer sides of the setting. Fig. 1 shows the approximate gas uptake temperature up to the commencement of gaseous firing, together with the temperatures of both flue and carbonising faces of the retort at positions A and B. The temperature of both sides of the retort wall at position C followed closely the temperature of the carbonising face at position B. It will be seen that, at the commencement of gaseous firing, the temperatures of the wall of the upper half of the retort ranged from 150° to 210°C., though a temperature of 600°C. was observed in the gas uptakes. The actual rate of rise of temperature during the first three days of gaseous firing was 4° to 6°C. per hr., falling off rapidly thereafter until a temperature of 700° to 900°C. was attained after eight days.

Gasmaking

During the first 2½ months of gasmaking the retort was operating at only 60% of the nominal throughput of 5 to 6 tons per day. It was possible, therefore, to assess the effect of varying the throughput on the temperature conditions obtaining in the retort wall.

When the retort was filled with coke, a rapid fall in temperature was observed at the carbonising face, amounting to 200°C. at all positions. This fall occurred over a period of 15 min. at positions A and B, but only 7 min. at position C. The more rapid fall at this last position probably resulted from the reduced heat supply to this part of the retort, since the position was not backed by a flue.

Tables 1 and 2 show the temperature conditions obtaining through the retort wall at each thermo-couple position with both the reduced and the nominal rates of throughput. The difference between the highest and lowest temperatures recorded during each day has been averaged for the whole period of observation—referred to as the average daily temperature variation; and the difference between the highest and lowest temperature recorded throughout the whole working period is referred to as the over-all temperature variation. Table 3 is included for comparison purposes and shows the temperature conditions observed during the previous survey. All the figures refer to the working period only and do not include scurfing. It should be pointed out that the carbonising face temperatures actually refer to the conditions prevailing within the brick approximately ¼ in. from the carbonising face. Similarly, the flue temperatures refer to a position within the retort wall ¼ in. from the flue face. The average temperature gradient represents the average temperature difference between these two points—*i.e.*, through 3 in. of the 3½ in. retort wall.

Considering the figures presented in Table 2, which can be taken to represent the normal working conditions, it will be seen that large temperature fluctuations occurred at the carbonising face at the top of the retort (position A), which can be accounted for, in part, by variations in flue temperature. It is probable that these latter variations are due mainly to fluctuations in the quantity and quality of producer gas resulting from the operations of producer cleaning and charging, since it was observed that a regular cycle of temperature change coincided with these operations. However, the carbonising face temperature variations must, in part, have been due to irregular travel of the charge, since these variations were of a much larger order than those occurring on the flue side. The overall temperature variations were very large, a range of 425°C. being observed. From the evidence of the temperature records it would appear that these large deviations from the average were caused by the occasional hanging of the charge, since it was observed that when a large rise in temperature occurred the small but regular variations in temperature caused by the operation of the discharging mechanism disappeared entirely. Abnormally low temperatures usually followed such large rises, presumably as the result of the rush of cold coal consequent on the drop of the charge. The operation of the discharging mechanism, which occurred at intervals of 20 to 25 min., caused a rapid drop in temperature amounting to 40° to 60°C. From the average working temperature on the carbonising face at position A, and the average daily temperature variation, it will be seen that during a normal day the temperature passed at least once through the quartz inversion point (575°C.). This fact was also noted by Heaton from the previous survey. It was originally suggested that this repeated passage through the quartz inversion point might be responsible for the disintegration of the refractory material that sometimes takes place at the top of continuous vertical retorts. A subsequent laboratory investigation, however, did not support this suggestion. In this investigation all specimens were cut from unused bricks; but it is possible that some friability might have been produced if the specimens had been impregnated with carbon while continually subjecting them to a cycle of temperatures involving the α—β quartz inversion. It is hoped to investigate this possibility when a suitable apparatus is available.

At position B (minor axis, 9 ft. down) it will be seen, from Table 2, that the average daily temperature variations amounted to only 60°C., though the overall variations

TABLE 1.—*Temperature Conditions at Throughput of 3 to 3½ Tons per Day.*

	Position A		Position B		Position C	
	CARB	FLUE	CARB	FLUE	CARB	FLUE
Average Working Temperature (°C.)	743	1,023	975	1,135	984	1,017
Average Temperature Gradient through Retort Wall (°C.)	280		160		33	
Average Daily Temperature Variations (°C.)	201	100	64	46	74	33
Overall Temperature Variations (°C.)	370	240	120	110	115	75

TABLE 2.—*Temperature Conditions at Throughput of 5½ to 6 Tons per Day.*

	Position A		Position B		Position C	
	CARB	FLUE	CARB	FLUE	CARB	FLUE
Average Working Temperature (°C.)	677	1,013	957	1,123	963	1,009
Average Temperature Gradient through Retort Wall (°C.)	336		166		46	
Average Daily Temperature Variations (°C.)	222	132	62	44	71	34
Overall Temperature Variations (°C.)	425	305	140	170	140	140

TABLE 3.—*Temperature Conditions Observed during First Survey.*

	Position A		Position B	
	CARB	FLUE	CARB	FLUE
Average Working Temperature (°C.)	680	900	920	1,130
Average Temperature Gradient through Retort Wall (°C.)	220		210	
Average Daily Temperature Variations (°C.)	240	65	140	60
Overall Temperature Variations (°C.)	450	180	200	200

were fairly large at 140°C. Here, again, it would appear that the fluctuations in flue temperatures were largely responsible, though it is likely that irregular travel of the charge was a contributory factor. At position C, which was at the same level as B but at one end of the major axis, the conditions of average temperature and temperature variations at the carbonising face were very similar to those at position B. It would appear, therefore, that, if the normal flaking distribution is eventually observed in this retort, the smaller amount of flaking at the end of the major axis compared with that of the minor axis could not be attributed to significant differences in average temperature, nor to the extent of temperature variations between these two positions. It must be pointed out, however, that the investigation was carried out on a 'corner' retort, and that position C was backed by the solid brickwork of the non-producer side wall. The temperature conditions observed at position C may not, therefore, apply at the other end of the major axis. One striking difference in temperature conditions between positions B and C was in the small temperature gradient through the retort wall at the latter position. Though the temperature gradient and, consequently, the heat flow through the retort wall at position C, were much smaller than at B, the carbonising face temperature was slightly higher at C. It can be argued, therefore, that at position C little heat transfer to the charge must occur. These observations would appear to support the contention that a free space exists between the charge and the retort wall at the ends of the major axis.

Effect of Reduced Throughput

From Tables 1 and 2 it will be seen that a reduced throughput had the effect of raising the carbonising face temperature at the top of the retort (position A) by 70°C. Both the average daily and overall temperature variations were also appreciably reduced, as was the temperature gradient through the retort wall. At positions B and C the effect of a reduced throughput on average temperature and average daily variations was small, and the temperature gradients through the wall were also little affected. However, at the lower throughput smaller overall temperature variations were observed in both positions at both sides of the retort wall.

The results obtained in the first survey by Heaton related to a similar retort having a type of discharging mechanism that operated continually instead of intermittently. This feature should not, however, seriously influence the temperature conditions. Table 3, which shows the figures obtained for the first survey, should, therefore, be comparable with the results shown in Table 2. Perhaps the most outstanding feature of such a comparison is the similarity of the average temperature and of temperature variations at the carbonising face at position A, which similarity, however, does not extend to the flue face. It will be seen that during the first survey the flue temperature at the top of the retort was over 100°C. lower, and the temperature variations considerably smaller than in the later survey. At position B, on the other hand, the average carbonising face temperature was somewhat higher and the temperature variations considerably lower during the second survey, in spite of almost identical conditions of flue temperature. If positions A and B are considered together, it would appear, therefore, that the effect of increasing the top temperature was to increase the temperature gradient through the retort wall at the top of the retort, to decrease the gradient 9 ft. down, and to induce considerably steadier temperature conditions at the carbonising face at this latter level. It is probable that the higher flue temperatures observed at the top of the retort during the second survey resulted from a higher producer-gas:secondary-air ratio. This would have the effect of raising the level at which temperature variations resulting from changes in gas quality would be most pronounced, since combustion would then continue further along the flue system. This seems to be a likely explanation of the more erratic flue temperature conditions observed at the top of the retort during the second survey, and at position B during the first survey.

During scurfing, which was by the downward method, the carbonising face temperature at the top of the retort (position A) was found to rise to 1,050° to 1,100°C. At this period of maximum temperature it was observed that the temperature gradient through the retort wall disappeared or was even reversed, though the carbonising face temperature never exceeded the flue temperature by more than 30°C. The carbonising face temperature at positions B and C rose during scurfing to 1,150° to 1,200°C. when for a short period at position B it was equal to the flue temperature. At position C, however, a reversal of temperature gradient occurred during scurfing, the temperature difference amounting to 80°C. during one operation, though 50°C was more common. It should be noted that this negative gradient was greater than the normal positive gradient during the working period. It was found that the maximum carbonising face temperature at position B always exceeded that at position C by about 40° to 50°C. After the peak temperature, which coincided with the maximum rate of oxidation of the scurf, had been reached, temperatures fell slowly at all positions to the levels characteristic of the empty retort. When this condition was reached the temperature drop through the retort wall was about 100°C. at positions A and B, and zero at position C.

Conclusions

(1) The temperature conditions obtaining in the wall of a continuous vertical retort have been determined for two rates of throughput at three positions—*viz.*, at the ends of the minor axis 3 ft. and 9 ft. from the top of the retort and at one end of the major axis at 9 ft. from the top. (Positions A, B and C, respectively.) At the normal rate of throughput, the average daily temperature on the carbonising face at the 3 ft. level (A) was 680° ± 110°C., and that at the 9 ft. level (B) was 960° ± 30°C., and at (C) 965° ± 35°C. Overall temperature variations during the working period were ± 210°C. at the top of the retort and ± 70°C. at the two lower positions. At the flue side of the retort wall the average daily temperatures were 1,010° ± 65°C., 1,120° ± 22°C., and 1,010° ± 17°C. at positions A, B and C, respectively, with corresponding overall variations of ±150°, ±85° and ±70°C.

(2) With similar flue temperature conditions, reducing the throughput to 60% of the normal was found to increase the carbonizing face temperature by 70°C. at position A, and by about 20°C. at positions B and C. Temperature variations at the carbonising face were appreciably reduced at position A, but unaffected at positions B and C.

(3) By comparing these results with those obtained during the previous survey, it can be deduced that the effect of raising the flue temperature at the top of the retort is to increase the average temperature gradient through the retort wall at the top of the retort, to decrease the gradient lower down, and to increase the stability of the temperature conditions lower down the retort.

(4) There was little heat transfer from the retort wall to the charge at the end of the major axis 9 ft. down the retort. By inference it would appear probable that these conditions apply over practically the full height of the retort.

(5) Though in a retort of this type the flaking tendency is much greater at the ends of the minor axis than at the ends of the major axis, little difference was observed in the average temperature or in the extent of temperature variations between these positions. The point C, at which the major-axis temperature conditions were recorded, may not, however, be representative, since it was backed by solid brickwork. A close watch will be kept on the retort to determine whether any difference in the degree of flaking between the two positions can be observed.

Our thanks are due to Mr. E. A. Davies, of the North Western Gas Board, and his staff, and to West's Gas Improvement Co., Ltd., and their staff for their willing co-operation in the conduct of the investigation.

DISCUSSION

Mr. **T. F. E. Rhead** (Chairman of the Refractory Materials Joint Committee) said he would like to begin by firing a few shots at the lethargy of the gas industry concerning refractories. Looking first at a few costs, two or three years ago he calculated, from current tenders for large retort houses, that the industry must have about £15 mill. locked up in refractories. Again, due to the wastage of refractories the industry was spending about £1 mill. per annum on repairs and renewals, not including labour for building. Shutting down for repairs involved grave consequential losses in gas output and was at the present time putting a severe brake on industry, with repercussions on the export drive and the standard of living.

He then turned his attention to what the gas industry subscribed to co-operative refractories research through the British Ceramic Research Association, and he found that it amounted to the magnificent total of about £3,500. The research which had been done, with the relatively small amount of money allotted to it, since the first Joint Committee was formed in 1909 and published its first specification for manufacture and testing of refractories in 1912 had easily doubled the output life of retort refractories, and he was confident that if the industry became 'refractories-minded,' and subscribed in a manner commensurate with the benefit possible, the output life could again be doubled. That might, of course, involve the use of new materials and improved design and construction.

The industry might become more 'refractories-minded' if they gave refractories a really important place in the educational curriculum, instead of, as at present, polishing it off with a few lectures tagged on to some other subject. Their lethargy had been further revealed in the areas as they discovered more and more how few gas undertakings had had their refractories purchases tested. A great deal remained to be done in applying even that modicum of knowledge which they already possessed, and nationalisation was giving a golden opportunity for doing this. They must seize it, to the all-round benefit of their industry.

He understood that the Gas Council, in its deliberations on the future of research in general in the gas industry, was considering what it was going to do about the refractories research. He sincerely hoped that it would not only retain the strong liaison with the British Ceramic Research Association, but would finance its share of the work in a manner worthy of the importance of refractories to the gas industry. The comprehensive ceramic organisation at Stoke, with its excellent staff and magnificent laboratories, had increasingly great possibilities for British refractories. It was the Mecca of British ceramic research, and each branch—carbonisation, steel, pottery, heavy clay, etc.—and the staffs of such branches, gained tremendously from being on the same campus.

The gas industry could not possibly of itself accumulate knowledge from such a wide field, nor offer such far-reaching experience and activity as were commanded by the organisation at Stoke. It was the outcome of the valuable experience and mature judgment of scientific men and enlightened industrialists. He would like, with a life-long experience of refractories and a sincere desire for the gas industry to have the best, to ask the Gas Council to continue the arrangement with the British Ceramic Research Association for refractories research, giving it adequate financial and moral support.

Mr. **Frank West** (Vice-Chairman, British Ceramics Research Association) said that the increasing momentum of industrial research drew heavily upon the supply of scientists and technicians of the highest calibre. For continued progress to be maintained in the solution of research problems it was essential that the research workers should be given the best possible apparatus, adequate space, and all possible facilities which were conducive to speed and accuracy. All these features would be available in the new laboratories of the B.C.R.A., now almost completed. He was pleased to say that some departments of the refractories section had already been transferred to the new building, and others were in process of being transferred. He felt sure that as a consequence it was possible to look forward to a further expansion of research activity on refractories problems, yielding fruitful results for both sides of industry.

So far as the present report was concerned there could be no doubt of the wisdom of continuing to focus attention on problems concerned with the constitution and durability of carbonising refractories. The linking of the temperature survey with the experiments on scurf deposition proved to be inevitable, since the results of the latter investigation had indicated the necessity for correlation with data from the former. From many angles it was desirable that as much information as possible should be obtained about the temperature existing at the carbonising face in the various zones of vertical retorts. The difficulties of obtaining such data were appreciated, as was indicated in the report on the temperature survey, but an extension of the trials to retorts of other sizes and to the lower zones would provide data of great value in relation to other factors affecting durability of refractories. The comparative data for the minor and major axis face positions were most valuable, and the observations in the particular retort concerned of the relative surface loss at these positions after a normal working period would be of great interest.

Dr. **A. T. Green, O.B.E.** (Director of Research, B.C.R.A.), said that the practical side of the Committee's work was inadequate. He wanted to make this point clear; the Gas Council was now in existence, and he insisted that the practical work on refractories was inadequate. Temperature surveys and similar work on retorts must not be done on one retort only, which might have its own peculiarities; it must be done on a number of retorts, and it must be done thoroughly. Statistically it was impossible to draw conclusions from one retort, though one could not stop anybody drawing those conclusions, if he wished to do so.

Thousands of these retorts, however, had been and were at work up and down the country, and as far as he could make out this was about the first attempt to put a thermo-couple in various places to find out what was happening inside the retort. That was silly, for how could one hope to understand what was happening inside a retort unless one made measurements of some kind or other? Was it possible, however, merely to shove a thermo-couple in when somebody was building a retort in the hope of having his good wishes? Did he like it? Certainly he did not; and therefore Dr. Green thought that there had to be organised action, taking a number of retorts and really studying them from the standpoint of temperature and quite a number of other factors. The temperature inside the retort and its fluctuations were, in his view, important in regard to what was happening to the refractories.

Worth Exploration

Mr. Rhead had said that there was about £15 mill. worth of refractories in these retorts up and down the country, with a possible expenditure of £1 mill. a year on those refractories. That would seem to indicate that it was worth making some kind of a percentage outlay on an exploration of those retorts. That was a simple, clear-cut matter. It seemed to him, therefore, that no matter what the gas industry did about hydrogenation and many other things that they had in mind in regard to the future production of gas, they were going to use these retorts for a very long time yet, and therefore they ought to know much more about them.

It was all very well for the workers on the research side to study their refractories, as they did, and to make post-mortem examinations of retorts. He could not get into a retort any longer, but there was a time when he could, and he went through and studied the surface of the retort and tried to see what could be regarded as the reactions which were taking place to cause the disintegration which was experienced. He was invariably lost, however, because what he saw was the summation of a hundred and one factors in the retort, and he was unable to see the one which was more important and the one which was less important, except to some degree.

Dr. **J. Burns** (North Thames Gas Board) said that after listening to Dr. Green's stimulating appeal he could only agree with him in the first place on the necessity for a greater co-operative effort in this research into one of the basic materials used in the industry. What was wanted, as he understood it, was something relatively simple; it was something in the nature of a temperature survey from their working retorts in order to try to find out exactly what reactions took place in the retorts and why the refractory material failed. That seemed to be a relatively simple matter, and it implied, as far as he was able to judge, the insertion of permanent thermo-couples in the walls of retorts at the time that they were built. The risk appeared to be that there would be leakage from the places where the thermo-couples were inserted, but he did not think that that risk was very great nowadays, in view of the various methods available to overcome those leakages. If he might make an offer on behalf of the North Thames Gas Board, he would be pleased to see that in one of their new retort installations which was going in at present there would be at least one retort fitted with a permanent thermo-couple installation.

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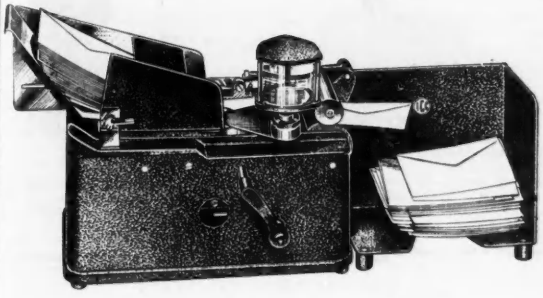

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The Herring Fisheries 1850

THE HERRING FISHERIES.—The official report on the herring trade in Stettin for the past season has been published. It appears that the import of Scotch herrings into Stettin for the past year has amounted to 150,000 barrels, being fully a third more than the importation of any previous year. The extra sale is no doubt attributable to the extremely low price to which the article had fallen in consequence of the superabundant supply.

TOMB OF THE REGENT MURRAY.—A second inspection has been made of the Regent Murray's vault in St Giles's Church, and it is stated that besides the two coffins formerly noticed, a third, a leaden one, bearing the marks of great age and of peculiar construction, being shaped so as to fit the head and body exactly, had been found. There was no inscription on this coffin. It has most probably been forced off when placing the silver coffins on top of it, or during the shifting of them when the church was [illegible]

Excerpt from "THE SCOTSMAN" Saturday, February 16th, 1850.

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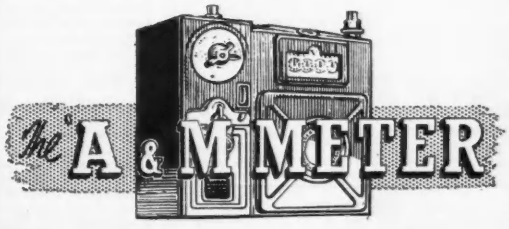

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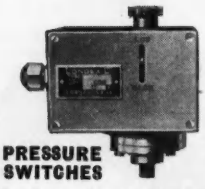
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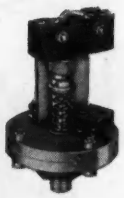
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Applications, with full particulars, should be sent in the first instance to: The Personnel Officer, The Woodall-Duckham Company, 63-77, Brompton Road, London, S.W.3.

DRAUGHTSMEN required for Chemical Works in North Lincolnshire, age 20-25, must have had good general training with some workshop experience and with technical qualifications up to H.N.C. The positions offered are permanent with good prospects. Write, stating age, experience, qualifications and salary required, to: No. 9946, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

TECHNICAL SALES REPRESENTATIVE required with experience in Gasworks and By-Product Plant design, construction and operation. Suitable applicants should be between 30 and 45 years of age, preferably with higher grade certificate of the Institution of Gas Engineers or equivalent qualification. Membership of the Institution of Gas Engineers an advantage. The appointment is superannuable and includes the use of a company car and participation in an efficiency bonus scheme. Please write stating age, qualifications, experience and salary required to the Personnel Officer, Newton Chambers & Co., Ltd., Thorncliffe, Sheffield.

WALES GAS BOARD
CARDIFF UNDERTAKING.
APPLICATIONS are invited for the following appointments to the Cardiff Undertaking:—
WORKS CHEMIST. Applicants should have had experience in carrying out all the necessary routine tests required in modern gasworks practice, including analyses of coal, coke, by-products, etc.
TECHNICAL ASSISTANT (COAL TESTING). The appointment involves responsibility for the whole of the work carried out at the Coal Testing Laboratory at Grangetown Gasworks, Cardiff, including the control and operation of a $\frac{1}{1,000}$ ton Coal Test Plant.
The applicant should be qualified by training and experience to undertake this work, which will cover all classes of coal carbonised throughout the Undertakings of the Wales Gas Board.
The salary in each case will be in accordance with Grade VII of the Board's Scale of Salaries (£450 to £530 per annum).
The successful candidates will be required to pass a medical examination and will be subject to the provisions of any superannuation scheme which the Board may introduce.
Applications, stating age, training, qualifications and experience, accompanied by the names of two referees, should be made to the undersigned not later than February 5, 1951.
FRANK BOARDMAN,
Engineer and Manager.
Gas Offices,
Bute Terrace,
Cardiff.

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/-; by post 1/2d.

NEW SUBSCRIPTION and CLASSIFIED ADVERTISEMENT RATES OPERATING FROM JAN. 1, 1951.

Subscription Rates: Home and Empire :- 52/- per annum; Foreign :- 60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone: Harrogate 84291.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. Telegrams: Gasking, Fleet, London.

APPOINTMENTS VACANT (ctd.)

EXPERIENCED GASHOLDER ERECTION FOREMEN required for contracts of all sizes. Applications, stating age, experience and salary required to: Robt. Dempster & Sons, Ltd., Rosemount Iron Works, Elland, Yorks.

WANTED FOR GAS WORKS IN INDIA.

TECHNICAL ASSISTANTS. Minimum age 25. Commencing salary about £900 per annum, plus Dearness Allowance of £180 per annum and Provident Fund. Furnished quarters available. Passages paid out and home. Strict medical examination necessary. Applications, stating age, whether married or single, qualifications and experience, should be made to No. 9948, *Gas Journal*, 11, Bolt Court, Fleet Street, E.C.4.

SCOTTISH GAS BOARD

LANARKSHIRE GROUP.

APPOINTMENT OF DISTRICT MANAGER.

HAMILTON DISTRICT.

APPLICATIONS are invited from qualified gas engineers for the position of DISTRICT MANAGER of the Hamilton District Gas Undertaking.

Applicants must be experienced in the administration and supervision of a gas undertaking, and have had sound practical experience in control of gas production plant, continuous vertical retorts, and distribution practice.

The appointment shall be within the salary range £850-£1,050 per annum.

Applicants should state whether or not the position they presently hold is superannuated and the successful candidate may require to pass a medical examination.

Applications, giving full particulars of age, qualifications and experience, together with *copies* of three recent Testimonials to be received by the undersigned not later than Monday, February 12, 1951.

FRED. R. MITCHELL,
Group Manager.

Gas Offices,
Uddingston,
Lanarkshire.
January 15, 1951.

SCOTTISH GAS BOARD

FIFE GROUP.

DUNFERMLINE DISTRICT.

GROUP DISTRIBUTION SUPERINTENDENT.

APPLICATIONS are invited for the position of GROUP DISTRIBUTION SUPERINTENDENT.

The salary will be on Scale Grade IX (£520-£620) with placing according to experience.

Candidates, in applying, should state technical qualifications, giving full details of previous experience with particular reference to use of Towns Gas for Industrial purposes and outlining previous experience in preparation and carrying out of integration schemes in high, medium, and low pressure distribution.

Applications to be sent in to reach the undersigned not later than February 1, 1951, with *copies* of Testimonials or the names of two persons to whom reference can be made.

The position is in the superannuation class and will be subject to such superannuation regulations as may in due course be made.

Medical examination may be required.

A three-apartment house at moderate rent is available with immediate entry.

DAVID L. DICKSON,
Group Manager.

Scottish Gas Board,
Fife Group,
Gas Works,
Grange Road,
Dunfermline.
January 8, 1951.

SCOTTISH GAS BOARD

LANARKSHIRE GROUP.
COATBRIDGE DISTRICT.
APPOINTMENT OF JUNIOR TECHNICAL ASSISTANT.

APPLICATIONS are invited from suitably qualified persons for the above appointment.

Applicants should have theoretical and practical experience in the operation and control of Continuous Vertical Retorts, Purification Plant, etc., and preference will be given to candidates holding the Ordinary Grade Certificate in Gas Engineering (Manufacture).

The Salary Scale will be A.P.T. 1/2 (£135-£370 per annum), with placing on scale according to qualifications.

The successful applicant will require to pass a medical examination and will be subject to the provisions of any Superannuation Scheme which the Board may introduce.

Applications, stating age, qualifications and experience, together with *copies* of references, should be received by the undersigned not later than February 17, 1951.

DAVID LAMBIE,
District Manager.

Gas Offices,
Burnbank Street,
Coatbridge.

RETORT HOUSE FOREMAN.

REQUIRED BY 800-900 MILLION WORKS IN VICTORIA, AUSTRALIA.

KNOWLEDGE of Glover-West Carbonising Plant, including supervision and control of Heats and general Retort Plant, operation and maintenance. Good opportunity suitable man. Salary to start, £800, plus superannuation benefit. Accommodation and passage can be arranged—Details at interview. Replies to No. 9947, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

SALES MANAGER / REPRESENTATIVE required by large manufacturers of Gas Meters, etc., in the North-West, with well-established connection in the North of England. Experience in the Gas Industry essential, and applicants are asked to give fullest particulars which will be treated in the strictest confidence. Remuneration commensurate with the importance of the position, and Pension and Life Assurance scheme in operation. Apply No. 9944, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

NORTHERN GAS BOARD

DARLINGTON DIVISION.

RENTALS SUPERINTENDENT.
(Revised Advertisement).

APPLICATIONS are invited for the appointment of a RENTALS SUPERINTENDENT for the Darlington Division. Salary will be in accordance with the N.J.C. Scales for Gas Staffs, Provincial "A," Grade A.P.T. VIII, viz., £490 rising to £570 per annum, initial placing according to qualifications and experience.

Applicants must have good experience in all aspects relating to the Rentals Department of a large Gas Undertaking, including mechanised Billing, Prepayment Records, Accounting Records, and control of Staff and Collectors. The successful candidate will be required to pass a medical examination and to subscribe to such Superannuation Scheme as may be adopted by the Board.

Applications, endorsed "Rentals Superintendent," stating age, experience and qualifications, and giving the names of two referees, should be addressed to the undersigned, not later than February 5, 1951.

F. WILSON,
Divisional General Manager.

Northern Gas Board,
John Street,
Darlington.
January 17, 1951.

RESEARCH ASSISTANT with degree in Chemistry, Physics or Engineering required. Industrial experience (particularly of power plant) definite advantage. Salary £400-£500, 5-day week. Superannuation Scheme. Apply in writing to the Assistant Secretary, Ref. A2, B.C.U.R.A., Randalls Road, Leatherhead, Surrey.

SOUTH EASTERN GAS BOARD

EAST SURREY DIVISION.

MECHANICAL SUPERINTENDENT, WADDON WORKS.

APPLICATIONS are invited for the position o f MECHANICAL SUPERINTENDENT, at Waddon Works, Purley Way, Croydon.

Applicants should be apprentice trained and have obtained Corporate membership of the Institution of Mechanical Engineers.

The applicants should have a sound theoretical knowledge and practical experience in the installation, operation and maintenance of steam raising and distributing plant, steam and internal combustion engines, turbines, boosters and pumps. They should also be familiar with mechanical handling and hydraulic machinery and have had extensive workshops experience in a supervisory capacity.

The salary will be not less than Grade IX of the National Salary Scales (Metropolitan Area) in respect of Administrative, Professional and Technical Staff (£550 to £650 per annum).

Applications in writing (quoting reference V10/131), giving particulars of age, training, experience, present occupation, etc., should reach the Personnel Manager, South Eastern Gas Board, Katharine Street, Croydon, not later than Saturday, February 17, 1951.

NORTH WESTERN GAS BOARD

WIRRAL GROUP.

CHEMISTS.

APPLICATIONS are invited for the following positions :—

(1) CHEMIST—Birkenhead Gas Works.
(2) CHEMIST—Wallasey Gas Works.
(3) CHEMIST—Chester Gas Works.

The successful applicants will be responsible to the Station Engineer of the Gas Works for conducting all necessary chemical tests associated with the process work being carried on, and to the Chief Chemist for any special investigations proposed from time to time.

Previous experience on a Gas Works is not necessary, but applicants should possess a degree, preferably in Chemistry.

The commencing salary will be within the range of Grade A.P.T. VIII of the National Salary Scales (£490-£570 per annum), according to experience and qualifications.

The successful applicant may be required to pass a medical examination, and to subscribe to such scheme of Superannuation as the Board may adopt.

Applications suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. CASTLE,
General Manager.

Hind Street,
Birkenhead.

(Classified advertisements continued on Supplement 4)

APPOINTMENTS VACANT (ctd.)

NORTH WESTERN GAS BOARD

WIRRAL GROUP.

TECHNICAL ASSISTANT—WALLASEY GAS WORKS.

APPLICATIONS are invited for the above position.

The successful candidate will be responsible to the Station Engineer for the chemical control of the ancillary plant. Applicants should possess the Higher Grade Certificate (Gas Engineering—Manufacture) of the Institution of Gas Engineers.

The commencing salary will be within the range of Grade A.P.T. V of the National Salary Scales (£385-£465 per annum), according to experience and qualifications.

The successful applicant may be required to pass a medical examination, and to subscribe to such scheme of Superannuation as the Board may adopt.

Applications suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. CASTLE,
General Manager.

Hind Street,
Birkenhead.

NORTH WESTERN GAS BOARD

WIRRAL GROUP.

DISTRICT SERVICE MANAGER—BIRKENHEAD.

APPLICATIONS are invited for the position of DISTRICT SERVICE MANAGER, Birkenhead.

The successful applicant will be responsible for all aspects of Consumer Service including the control of gas fitting and maintenance staff, and the supervision of Showrooms within the Birkenhead District. Responsibility will commence at the inlet to consumers' meters.

The commencing salary will be within the range of Grade A.P.T. XII of the National Salary Scales (£645-£770 per annum), according to experience and qualifications.

The successful applicant may be required to pass a medical examination, and to subscribe to such scheme of Superannuation as the Board may adopt.

Applications suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. CASTLE,
General Manager.

Hind Street,
Birkenhead.

NORTH WESTERN GAS BOARD

WIRRAL GROUP.

DISTRICT DISTRIBUTING ENGINEERS.

APPLICATIONS are invited for the following positions :—

(1) DISTRICT DISTRIBUTING ENGINEER —Birkenhead.
(2) DISTRICT DISTRIBUTING ENGINEER —Wallasey—Hoylake.
(3) DISTRICT DISTRIBUTING ENGINEER —Chester—Ellesmere Port.

The successful applicants will be responsible to the Group Distributing Engineer for all aspects of Distributing Engineering, including the control of mainlaying and service laying staff, and the supervision of mainlaying work carried out by Contractors, within the District for which they are responsible, together with the preparation of schemes for the modification or extension of the existing mains network.

Applicants should have had practical experience of the type of work called for, and should possess the Higher Grade Certificate (Gas Engineering-Supply) of the Institution of Gas Engineers or its equivalent.

The commencing salaries will be within the ranges :—
Birkenhead District—£595—£720 per annum (Grade A.P.T. XI of the National Salary Scales).
Wallasey/Hoylake District—£520—£620 per annum (Grade A.P.T. IX of the National Salary Scales).
Chester/Ellesmere Port District—£520—£620 per annum (Grade A.P.T. IX of the National Salary Scales),
according to experience and qualifications.

One application will suffice for candidates who wish to be considered for any of the vacancies, but the application should clearly indicate whether it is in respect of any one or each of the vacancies.

The successful applicants may be required to pass a medical examination, and to subscribe to such scheme of Superannuation as the Board may adopt.

Applications suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. CASTLE,
General Manager.

Hind Street,
Birkenhead.

NORTH WESTERN GAS BOARD

BURY/ROSSENDALE GROUP.

TECHNICAL ASSISTANT.

APPLICATIONS are invited for the above position at the Rossendale Undertaking at a commencing salary within the range £385-£465 per annum, dependent upon the applicant's ability and qualifications.

Applicants should be conversant with the control and operation of all Gas Works Plant, experience in the operation of Horizontal Retorts will be an advantage.

The successful applicant will be required to pass a medical examination and to subscribe to such Superannuation Scheme as the Board may adopt.

Detailed applications, endorsed "Technical Assistant," together with the names and addresses of two referees should be forwarded to the undersigned within 14 days of the publication of this advertisement.

W. B. HARRISON,
General Manager.

Gas Showrooms,
Broad Street,
Bury.

NORTH WESTERN GAS BOARD

BLACKBURN GROUP.

OSWALDTWISTLE UNDERTAKING.

STATION ENGINEER.

APPLICATIONS are invited for the position of STATION ENGINEER at the Oswaldtwistle Undertaking at a salary in accordance with Grade A.P.T. VIII of the National Salary Scales (£490-£570 per annum), including the value of the occupation of a house.

Candidates should possess the Higher Grade Certificate of the Institution of Gas Engineers, and preferably should have had experience in the control of horizontal retorts.

The successful candidate may be required to pass a medical examination and to subscribe to such scheme of Superannuation as the Board may adopt.

Detailed applications, together with the names and addresses of two referees, should reach the undersigned within 14 days of the publication of this advertisement.

A. H. NICHOLSON,
General Manager.

Cardwell Place,
Blackburn.

NORTH WESTERN GAS BOARD

WIRRAL GROUP.

DEPUTY STATION ENGINEER—BIRKENHEAD WORKS.

APPLICATIONS are invited for the above position.

The successful applicant will be responsible to the Station Engineer for the general supervision of all the activities carried out on the Works, including the control of labour. Applicants should possess the Higher Grade Certificate (Gas Engineering—Manufacture) of the Institution of Gas Engineers or its equivalent.

The commencing salary will be within the range of Grade A.P.T. X of the National Salary Scales (£570-£670 per annum), according to experience and qualifications.

The successful applicant may be required to pass a medical examination, and to subscribe to such scheme of Superannuation as the Board may adopt.

Applications suitably endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. CASTLE,
General Manager.

Hind Street,
Birkenhead.

EASTERN GAS BOARD

INTERNAL AUDITOR TO THE IPSWICH DIVISION.

APPLICATIONS are invited for the above appointment. Commencing salary will be in accordance with the National Joint Council for Gas Staffs Scale A.P.T. Grade X Provincial A, £570-£670.

Applicants must be suitably qualified either by examination or experience for the position and should be energetic, tactful and able to drive a car. The Board is unable to provide living accommodation. Reasonable allowances will be made for travelling and subsistence. The selected applicant will be under the supervision of the Board's Chief Internal Auditor.

Applications, giving personal details, present position and salary, should reach the undersigned not later than Monday, February 5, 1951.

R. H. EPPS,
Secretary.

Eastern Gas Board,
2, The Abbey Garden,
Westminster, S.W.1.

CONTRACTS OPEN

WALES GAS BOARD

SWANSEA GROUP.

PAINTING OF GASHOLDERS.

THE Committee of the Swansea Group of Undertakings of the Wales Gas Board invite from appropriate Contractors tenders for the PAINTING OF GASHOLDERS at Gas Works within the Group, also tenders for the Supply and Delivery of the necessary Paint.

Applications for copies of Specifications, and for particulars of Gasholders to be painted should be received not later than February 21, 1951, by the Convener.

A. PICKARD, M.INST.GAS E.

Gas Offices,
Murray Street,
Llanelly.

WALES GAS BOARD

LLANELLY UNDERTAKING.

TENDERS are invited for the supply, delivery and erection of extensions to the DRY PURIFICATION PLANT. Existing plant of 4 overhead cast iron purifiers was newly erected in 1944, and provision was made at that time for the extensions for which tenders are now invited. Copy of Specification may be obtained on application to the undersigned.

Tenders, enclosed in sealed envelopes and endorsed with the names and addresses of the firms tendering and marked "Tenders for Dry Purifier Extensions" should reach the undersigned by first post, Wednesday morning, February 21, 1951.

The lowest or any tender will not necessarily be accepted.

A. PICKARD, M.Inst.Gas E.,
Engineer, Manager and Secretary.

Gas Offices,
Murray Street,
Llanelly.

The
LIMIT OF EFFICIENCY CAN BE REACHED
by the use of
LUX
GAS PURIFYING MATERIAL

Sole Importers:
HARRISONS (London) LIMITED
66, Mark Lane, LONDON, E.C.3
Telegrams: Birchrock, London *Telephone:* ROYal 3120

HAWKINS
IMPERISHABLE
JOINTING PASTE
Non-poisonous, cheaper and better than red lead, ideal for gas, steam or water.
IRON CEMENT
Looks like iron, can be buffed burnished or drilled and automatically caulks itself into any joint.
W. T. HAWKINS & Co.
CHAPEL HILL - - - - - - - - HUDDERSFIELD
Send for Sample Tin POST FREE.
Sole Agents for Australasia
W.T. HAWKINS (Australia) Pty Ltd,
Hardware House, Hardware Street,
Melbourne, Australia.

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WHERE'S YOUR
NU-SWIFT?
The World's Fastest Fire Extinguishers — for every Fire Risk
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In Every Ship of the Royal Navy

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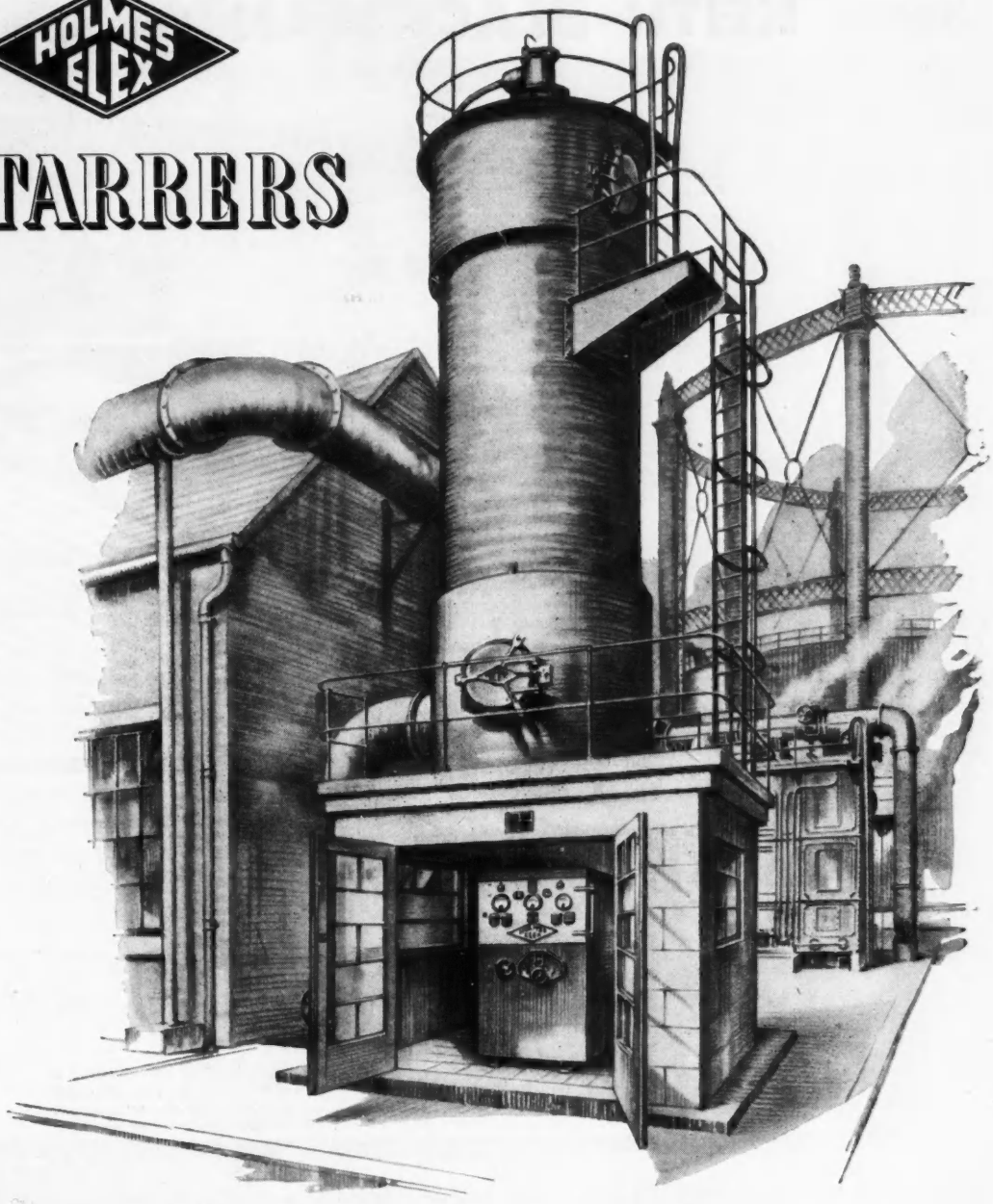
DETARRERS



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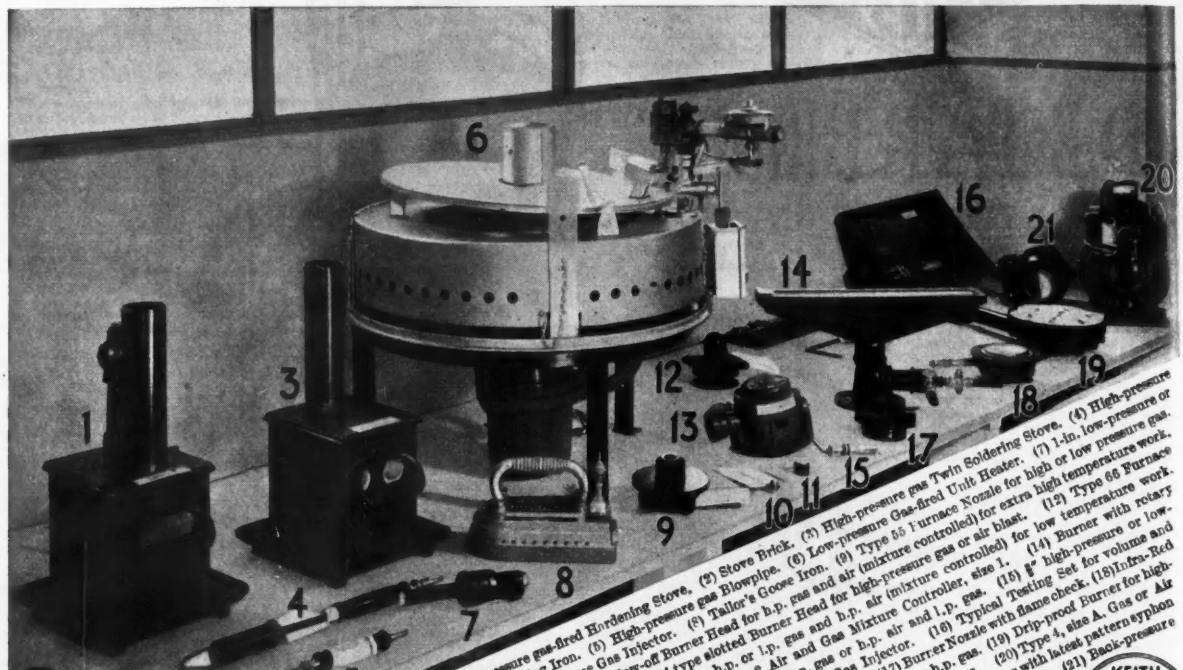
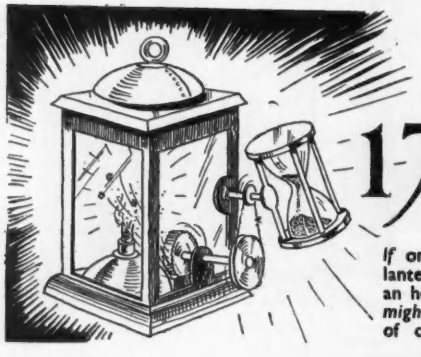


(1) High-pressure gas-fired Hardening Stove. (2) Stove Brick. (3) High-pressure gas Twin Soldering Stove. (4) High-pressure gas Soldering Iron. (5) High-pressure gas Blowpipe. (6) Low-pressure Gas-fired Unit Heater. (7) 1-in. low-pressure or high-pressure Gas Injector. (8) Tailor's Goose Iron. (9) Type 55 Furnace Nozzle for high or low pressure gas. (10) Non-blow-off Burner Head for h.p. gas and air (mixture controlled) for extra high temperature work. (11) ¼" "F" type slotted Burner Head for high-pressure gas or air blast. (12) Type 66 Furnace Nozzle for h.p. or l.p. gas and air (mixture controlled) for low temperature work. (13) Type 2 Air and Gas Mixture Controller, size 1. (14) Burner with rotary head for h.p. gas or h.p. air and l.p. gas. (15) ¼" high-pressure or low-pressure Gas Injector. (16) Typical Testing Set for volume and pressure. (17) Burner Nozzle with flame check. (18) Infra-Red Burner for h.p. gas. (19) Drip-proof Burner for high-pressure gas. (20) Type 4, size A. Gas or Air Compressor with latest pattern syphon lubricator. (21) Back-pressure valve

KEITH BLACKMAN LTD. MILL MEAD ROAD LONDON, N.17.



1769

If one John Box *had* invented a lantern to which was attached an hourglass and tinder box, this *might have been* the first example of controlled lighting ignition.

NOWADAYS, OF COURSE, THE MOST EFFICIENT AUTOMATIC LIGHTING APPARATUS BEARS THE NAME

"GUNFIRE"

THE TRADE MARK OF

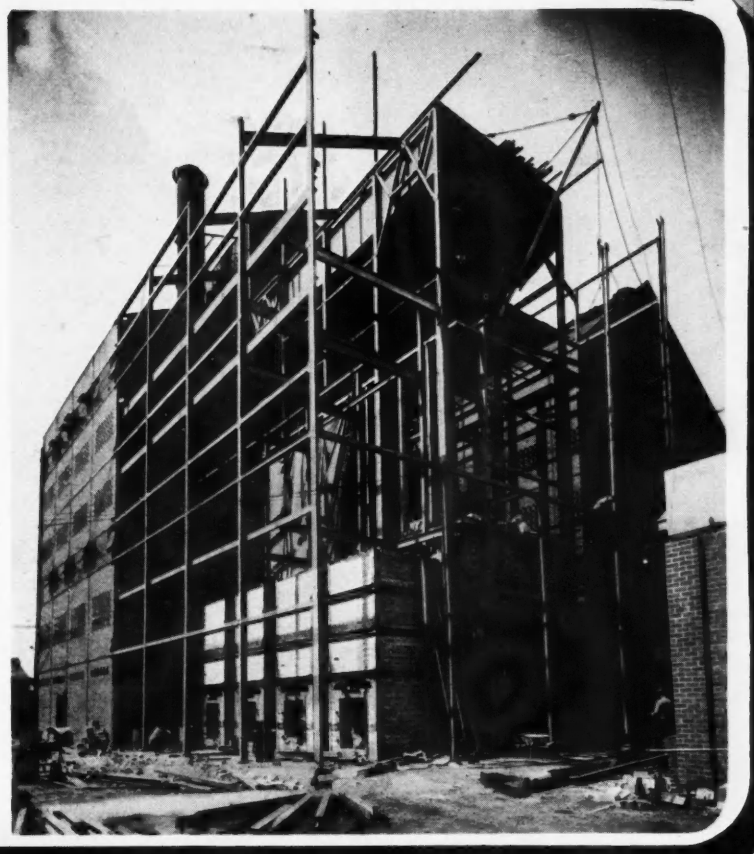
THE BRITISH, FOREIGN & COLONIAL AUTOMATIC LIGHT CONTROLLING CO. LTD.

BOURNEMOUTH.

ESTABLISHED OVER HALF A CENTURY.

Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C.4. Wednesday, January 24, 1951.

Work in progress



FOOTSCRAY, AUSTRALIA

Since the original carbonizing plant at Footscray consisting of 24 retorts was installed in 1926, several additions have been made. The latest extension, shown here, comprises 16 retorts, bringing the total number of retorts to 80.

West's Gas
IMPROVEMENT CO., LTD.
MILES PLATTING, MANCHESTER, 10
Telephone: COLlyhurst 2961-5. Telegrams: Stoker, Manchester.
COLUMBIA HOUSE, ALDWYCH, W.C.2. Telephone: HOLborn 4108-9. Telegrams: Wegesco, Estrand.

". . . we have each of us a trade and are in our proper position when exercising it . . ."

Wellington's reply to Canning in 1827 when asked to become Prime Minister.

WELLINGTON TUBE WORKS LTD

FOR STEEL TUBES AND STEEL TUBE FABRICATION

HEAD OFFICE & WORKS · GREAT BRIDGE · TIPTON · STAFFS